Helping Youth Athletes Thrive:

An Exploratory Study of the Youth Tennis Market in New Zealand

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Deposited 2019

A thesis submitted to Victoria University of Wellington in fulfilment of the requirements
for the degree of Master of Innovation and Commercialisation

Victoria University of Wellington

Abstract

This project investigated the commercial opportunities for innovation in the youth tennis market. A lean startup methodology approach was adopted for business development within the project. The first study consisted of interviewing players, parents and coaches involved in the youth tennis environment in New Zealand. It was found that the key problems identified by athletes were psychological challenges while both coaches and parents struggled with relationship management. The second study surveyed athletes from a wide range of sports to test if the findings from the first study would generalise to other sports as well as investigating reasons why athletes may not have engaged with existing sport psychology products and services. The results showed the findings in the first study did extend to other youth sports and highlighted a lack of knowledge and perceived efficacy as well as financial cost as barriers to use for existing sport psychology products and services. A literature review relating to the problems identified during the research for this project documents motivational, goal-setting and self-regulatory mechanisms which could be incorporated into a product or service to assist youth athletes. A third, and final, study tested potential mediums for a commercial offering as well as reaction to several features. The findings support the use of a mobile phone application and features relating to communication, motivation, goal-setting, and self-regulation were all supported. A business case presents a path to commercialisation for a mobile phone application addressing the problems faced by youth athletes utilising key research identified in the literature review. This project was able to identify a clear market need, uncover solutions and present the next steps in developing a commercially viable product.

Acknowledgements

First, and foremost, I would like to thank my supervisor, Marc Wilson, for his advice and guidance. His sharp eye and quick wit provided me with energy and motivation when it was most needed. I would also like to thank Jenny Douche, the programme director, whose tireless work and considerable business acumen helped shape this project.

To all of my former and current students, you provided the inspiration for this project. Thank you to all of my participants who generously gave their time, and made this research possible. And, lastly, thank you to friends and family who supported me in this research and helped keep me on track.

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List of Abbreviations

AASP: Association for Applied Sport Psychology

ABA: Applied Behaviour Analysis

MCII: Mental contrasting with implementation intentions

MVP: Minimum Viable Product

SDT: Self-Determination Theory

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Foreword

I completed a BSc, majoring in physics and psychology, and went on to gain a first class honours degree in psychology focusing on behavioural, social and cognitive aspects. Following this, I started a tennis academy to work intensively with a small number of athletes. My role involves working with adolescent athletes aspiring to gain scholarships to compete in US College tennis. As a result of this work, I was named the New Zealand Performance Coach of the Year by Tennis New Zealand in 2018.

Throughout my time coaching, I have witnessed many of the positive outcomes athletes are able to gain through striving for mastery, and my motivation for this project is to create a product or service that will help more people enjoy these types of experiences. Furthermore, both in my coaching and this project, I hope that some of the skills developed by athletes on the tennis court translate to all areas of their lives. There are only a few hundred men and women earning a living as tennis players in a global sport so, while few athletes I work with will go on to be professional tennis players, I hope to make a positive and significant impact on their lives in general.

While my experience gives me insights into the tennis industry, I have had to be particularly aware of the biases my coaching and psychology background bring to this project. It has been an enlightening and, at times, confronting process investigating existing issues from the point of view of players and parents, while also complementing my own, as a coach. Developing an offering that will be genuinely helpful to a wide group of players has been an important aspiration to return to throughout the project, to reduce the risk of my personal biases clouding decision making.

Chapter 1:
Introduction

Helping Youth Athletes Thrive:

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The following research seeks to explore ways in which to introduce scientific research to a consumer product or service. It has been conducted as part of the Master of Innovation and Commercialisation programme at Victoria University of Wellington. The work of leading start-up business writers such as Drucker, Christensen and Ries have shaped the market research and business development. This research has been conducted with the intention to not only commercialise insights derived from this research, but also to genuinely improve the lives of youth athletes, and other stakeholders in the market.

This thesis contains an academic component and a business case (see figure 1 for an overview). The introduction outlines relevant business literature followed by two market validation studies, a literature review and, lastly, a product validation study. This research process is atypical of academic work, with the literature review occurring late in the research process, but in this project it was important to be guided by the needs of the market. The decision to consult existing literature only after the market validation studies were conducted was made to reduce any bias in analysis of the data. This created challenges in the research, for instance, without a thorough understanding of the literature it was not possible to include some measures that are relevant in the studies conducted for this project. However, it allowed the open-mindedness necessary to be guided by the market problems identified rather than, potentially, preempting the market problems with literature already consulted. Following the academic component of this report, a business case is outlined which presents findings pertaining to the commercialisation process and is written as a document that can be presented to

potential investors and other interested parties in the business community. It is intended to be a stand-alone document and, as such, there is some repetition from earlier chapters.

Figure 1: Report Structure

As this research was exploratory in nature, and the direction was determined as research was conducted, it is useful to consider how this process developed. Therefore the introduction will present the project as it initially started. As the specific direction evolved, additional literature reviews were conducted, and these are presented throughout the report reflecting the order in which they were done. This allows the reader to better appreciate the development of this project.

1.1 Objectives

The overarching objective of this research was to investigate technologies that may be used to enhance player development in tennis, and then identify and explore the best path to commercialisation. The types of technologies that were considered included websites, mobile phone applications and personal sensors (e.g. devices that track physical activity). Enhancing player development included any intervention that enhanced training quality, duration of training, desire to train or improved subjective feelings towards training or competition. It was assumed that any of these positive changes would lead to more rapid skill acquisition and better outcomes for athletes at the end of their junior career. Junior tennis players or youth athletes will be defined for this project as an athlete or tennis player that is aged 18 years or younger.

This project could have many positive outcomes for both individuals *and* society, as greater participation in youth sports is positively correlated with greater activity levels and associated health benefits right through to adulthood (Shores, Becker, Moynahan, Williams, & Cooper, 2015). Also, participation in youth sport enhances mental health (Swann et al., 2018) and can even help protect adolescent men against suicidal behaviour (Southerland, Zheng, Dula, Cao, & Slawson, 2016). Furthermore, high

performance in youth sport has been found to be associated with both stronger academic performance in tertiary education and higher salary once in the workforce (Sauer, Desmond, & Heintzelman, 2013).

The commercial success of an eventual product or service was a key objective for this project and commercial viability was considered throughout the project. While this implies a financial motivation to the project, this is valid insofar as it allows for the continued ability to offer a product or service and provide benefits to users.

1.2 Scope and Development of the Project

With innovation comprising a major focus in this research, it is important to first define “innovation”. Drucker (1985) conceptualises innovation as windows of opportunity that are either inward or outward facing in regard to a given firm. This project is primarily focused on the ‘new knowledge’ window by investigating the youth tennis industry and seeking to solve existing problems using technological or scientific developments.

Furthermore, this project is intended not *only* to be innovative but, also, to create a disruptive innovation that will be commercially successful. That is an innovation that seeks to develop and introduce a new value proposition to the market (Christensen, 1997). Disruptive innovation may underperform existing products in the current market and will often have features that are appealing to a market niche and are often cheaper, simpler and easier to use (Christensen, 1997). This ties in with the concepts derived from Drucker (1985) where this project is focused on using new knowledge to bring a new value proposition to the niche market of youth tennis players.

This project focused on two types of commercial opportunities for disruptive innovations to enter the market, based on a set of circumstances that Christensen (1997) has identified. Firstly, existing products and services have features added and performance increased at a pace that often outstrips market demand. These customers are considered to be overserved by the current market offerings. This leaves room for a start-up to enter the market with low-end innovation and provide a product or service that meets market demand, and no more, and do so at a lower cost. Another opportunity is present where existing businesses focus on established products, services and markets, and fail to correctly identify future trends and the way the market will utilise a disruptive product. The mistake here is in not considering non-customers and how innovation may be able to introduce more customers to a market. This tunnel vision from existing firms gives start-up companies time to gain more knowledge about the market and meet previously unmet needs. To avoid missing these opportunities Christensen (1997) urges any managers dealing with disruptive innovation to focus on learning and discovery, rather than solely on planning execution.

Another leading entrepreneurial system is lean startup methodology outlined by Ries (2011) which details the process of creating a minimum viable product (MVP) as quickly and inexpensively as possible, and then iterating from there in a process of continuous incremental improvement based on data collection and analysis (see figure 2). Lean startup methodology applies scientific methods to a startup environment with many unknowns in order to determine the best path to a commercially viable product or service. Collins (2012) empirically tested this theory by comparing good companies to great companies. He found that the great companies first tested their hypotheses by collecting evidence from the market while expending minimal resources. Once a market

fit was identified, the great companies invested significant resources into the development of commercial offerings. The less successful companies were more likely to develop products and services without going through this low-cost calibration process.

Figure 2: Lean startup methodology innovation cycle (Ries, 2011)

Furthermore, Ries (2011) describes value as only that which provides benefit to the customer - a critical insight that helped shape this research and reduce risk of bias in the analysis by always striving to uncover potential benefits to the customer. In this project, the key objective of assisting the development of youth tennis players is well aligned with the position of Ries (2011) and any value created was always considered in this context.

This was done by considering existing problems for stakeholders. Once the problems are identified it is important to identify existing solutions to these problems. If

effective and low-cost solutions are available to the market (as a commercial product or service or 'work-around' solution), then it can be considered that the market is able to solve this problem to a satisfactory level and unlikely to lead to a commercially successful solution. However, if current solutions are costly, either financially or time-consuming, or ineffective, then this problem may lead to a commercially viable product or service. If there are no solutions offered at all then it can either be inferred that the problem is not significant enough to warrant action, or there is a lack of knowledge in the market regarding solutions. Therefore, this research first needs to identify problems and the corresponding solutions that stakeholders are experiencing in order to determine the direction of the project.

The phases that will form this research are market validation, product validation, business model design and resource requirements. The market validation process set out, primarily, to research two factors, market problems and existing solutions, in an iterative process and then identified potential innovations gained from insights from existing literature. Once a clear unmet need was identified, product validation took place, presenting a potential solution to stakeholders and testing reaction in order to determine if the offering is suitable. Concurrent to looking at market and product validation, business model development took place using the lean canvas (Maurya, 2012) as the basis for analysis. The product validation phase investigated technology preferences, the appeal of potential features and pricing. Projecting resource requirements were included, but only for projections to bring a minimum viable product to market as Christensen (1997, p. 158) states, "It is simply impossible to predict with any useful degree of precision how disruptive products will be used or how large their market will be".

The development of an MVP would also require prototyping, this is discussed, but the execution of prototyping for this project is not included in the scope of this thesis.

1.3 Market Identification

While the tennis industry in New Zealand is relatively small, with approximately 35,000 club affiliated club members (Tennis New Zealand, 2017), on a global scale the tennis market is significant. Estimates put the industry value at USD 5.7 billion annually, in the United States of America alone (Tennis Industry Association, 2015) with approximately 75 million tennis players worldwide (International Tennis Federation, 2018).

In the United States of America, colleges and universities offer tennis players scholarships for some players representing the school. In 2017 there were 1184 such schools, offering a pool of approximately USD 90 million in scholarships (O'Rourke, 2015). Once other benefits are factored in, such as coaching, physical training, apparel, equipment and travel, collegiate tennis scholarships can be valued at up to USD 400,000 over a four-year career (Tennis Canada, 2012). This is a major driver of youth performance tennis and must be kept in mind as to how it can be incorporated into any potential offering to that market.

Drucker (1985) identifies four entrepreneurial strategies to provide a clear market focus. They are; being first to market, using creative imitation, occupation of a specialised niche and taking advantage of new trends. This project intended to first find a specialised market niche and then seek strategies to fill it by utilising one path in particular identified by Drucker (1985). Specifically, to focus on a market niche built around expert market knowledge within the project team. Given this, the decision to

focus on youth tennis players was made as the market for products and services targeting enhanced skill development is well developed. Further, the project team has extensive knowledge and professional networks in this segment of the market.

The market this project is focusing on is defined as existing youth tennis players aged under 18 years and participating in tennis ten or more times annually. While participating in tennis ten times annually does not represent a high level of commitment, as a group, the mean annual participation rate is 42 times annually with an estimated mean annual spend of \$448 (USD) per player (Tennis Industry Association, 2015). In the United States of America, there were 2.68 million people that fit these criteria (Tennis Industry Association, 2017) which was determined to be a sufficient market size while also maintaining a clear market segment to target.

While this project is focused on producing an offering to the global youth tennis market, New Zealand will be a useful testing ground. There are approximately 16,000 junior club members (Tennis New Zealand, 2017), about half of these players are aged under 12 years. Using the New Zealand market in the initial stages of a commercial release will provide valuable information about the best customer profiles to target within the youth tennis market as a whole (for example, which age-groups, level of play, experience). This is in line with current business practices, with many technology-based companies using New Zealand as a testing ground for new features or products (Cann, 2016; O'Mahony, 2015).

The potential to target non-tennis athletes and attract them to participate in tennis was also considered as a strategy. However, the decision to focus on existing players was made for two reasons. Firstly, the Physical Activity Council (2016) report found that no racquet sports featured in the top 10 aspirational sports for any age group

among non-existing participants. Secondly, it was determined that existing players provided a large enough market without the need to look further afield in the initial stages of this project.

1.4 Opportunities Identified Initially

In order to provide context to the project, the following opportunities were identified prior to the conduct of any primary research. This collection of opportunities is not intended to be exhaustive, but rather an indicative range of potential directions for the project. This provides reassurance that the research project has the potential to produce a fruitful outcome in terms of identifying a commercially viable product or service.

1.4.1 Tennis Racquet Sensor

Sensors have been fitted to tennis racquets using devices such as accelerometers and gyroscopes to identify swings (e.g. forehand, backhand, serve) and provide measurements for each swing (such as ball speed, ball spin, swing speed). There have been a number of tennis racquet sensors released in recent years with the existing products are primarily competing at the high end of the market (see for review Johnson, 2016) which has lead to a market with many products with rich feature sets and high prices. These conditions suggested there may be an opportunity for low-end disruption to meet the needs of over-served customers (as argued by Christensen, 1997). These sensors are both a learning and motivational tool and, incorporating new insights from the motivational and psychological literature may provide a commercial advantage to a potential low-end disruptive product.

1.4.2 Developmental roadmap

Another opportunity that may also incorporate motivational processes relates to another gap in the market. Currently, there are *no* products on the market to assist coaches, players and parents in mapping long term development so it is left to each coach, or sometimes parents, to come up with a solution independently. Generally, tennis players will train and compete for up to 13 years as juniors (Tennis New Zealand, 2018) and within this training, there are many aspects that need to be developed. Players and coaches need to consider technical, strategic, physical and psychological aspects of tennis and having a product that tracks all of this could help accelerate progress.

1.4.3 Complementary training programme

An alternative approach identified was to focus on complementary areas, such as physical training or sport psychology; the application of psychological knowledge and skills to optimise the performance and well-being of athletes (American Psychological Association, 2003). These are areas in which coaches may be less knowledgeable and could be ignored or overlooked as a result. A potential benefit of this opportunity is that, by focusing on these auxiliary areas, coaches may feel less ‘threatened’ than with a product incorporating primary areas of technical development and strategy, and thus more likely to promote the use of a product developed.

1.4.4 US college recruitment

Another area that was identified as a potential to yield further opportunities is focusing on US college recruitment. Approximately 30% of US college tennis players are

from outside of the United States of America and many of these players must engage the use of recruitment agencies (O'Rourke, 2015). This is a significant expense and one that is largely based on information asymmetries in the market. Players do not understand the process of recruitment, and college coaches do not understand the level of play in foreign countries. It was investigated whether a solution to this problem could be incorporated into the final product.

1.4.5 Summary of Opportunities

Thus, at the start of the project there were a number of potential opportunities identified; low-end disruption of the smart tennis sensor market, a development mapping product, complementary training programmes, and enhancing connections between tennis players and US Colleges. During the course of this research, all potential opportunities were investigated initially simultaneously and narrowed down over the market validation stage. Solutions that could likely be applied to problems in other settings were favoured, as these may pose greater commercialisation prospects. All of these opportunities assume that players will embrace any innovation that will work to enhance their development.

1.5 Business Model Development

Developing initial business models for the full range opportunities identified was deemed an inefficient use of resources, as the focus of this project was intended to be narrowed over the course of the research. However, the tools to analyse and develop the business model were identified at the outset of this project. Each choice was

considered in the context of lean startup methodology (as this is a fundamental approach in this project) attempting to produce a unified and consistent analysis.

1.5.1 Business Model Representation

The first step in developing potential business models was to select a representation tool. The business model canvas developed by Osterwalder, Clark and Pigneur (2010) was used as the basis for business model development and is amongst the most popular business model representations (Spieth, Schneckenberg, & Ricart, 2014). Trimi and Berbegal-Mirabent (2012) suggest there are a number of benefits to utilising the business model canvas. They note the opportunity for constant reflection and enhanced creativity, along with the need to consider elements of the business model as both individual elements *and* how they integrate as a whole. Building on the work of Osterwalder et al. (2010) the lean canvas (figure 3) was developed by Maurya (2012) by incorporating elements from lean startup methodology to the business model canvas. Aligned with the approach taken in this project, the lean canvas is focused on understanding customer needs (Gierej, 2017). The lean canvas consists of nine sections; problem, solution, key metrics, unique value proposition, unfair advantage, customer segments, channels, cost structure and revenue streams. The lean canvas will be utilised as the basis for business model development in this project as it combines the benefits of the business model canvas with lean startup methodology.

by the market norm of tennis manufacturing companies providing significant sponsorship packages to coaches in order to associate themselves with individual coaches. As a result, a business model that allows coaches to benefit, financially or otherwise, will be developed during the course of this research. This hypothesis was tested during market validation.

Other stakeholders (such as intermediaries; responsible for distributing a product or service and enablers; entities with a controlling function in the market, such as a tennis association or federation) need to be considered and consulted as the project develops. These considerations are outlined in chapter seven.

1.5.3 Environmental Analysis

In order to assess the commercial opportunities for potential products or services identified during the course of this project, they need to be considered relative to the current market environment. Law (2011) identifies SWOT analysis (an acronym for; Strengths; Weaknesses; Opportunities; Threats) as a strategic business tool used in early stages of planning. It can be used to identify both internal and external factors that will be important to the success of a business (Berry, 2013) with an outward facing viewpoint (Law, 2011). Conversely, PEST analysis (an acronym for; Political; Economic; Social; Technological) takes an inward facing perspective (Law, 2011). Post (2018) argues that, in addition to SWOT analysis, business planning should include PEST analysis. The benefits of PEST analysis are more effective strategic planning while highlighting potential opportunities or dangers (Post, 2018). This project will employ both a SWOT and PEST analysis as part of the evaluation of potential offerings.

1.5.4 Marketing Strategy

The “4 P’s” model of product, price, place, promotion has been a cornerstone of modern marketing for decades (Goldsmith, 1999). However, this model has been found to produce a narrow, product focused marketing approach for “b2b” businesses, those that sell their products and services to other businesses (Ettenson, Conrado, & Knowles, 2012). The authors suggest a new model that reflects modern business trends, represented by the acronym SAVE; Solution, Access, Value, Education. This model is based on the components of the 4 P’s and, therefore, could be considered an update to the model. The SAVE model emphasises a solution focus rather than a feature focused approach when promoting a product. By shifting from a price to a value focus, marketers are encouraged to highlight the benefits relative to the price rather than focusing solely on price.

This focus on solutions and benefits represents a more customer-centric approach and aligns well with lean startup methodology. However, the SAVE model was developed for b2b businesses and this project may, or may not, utilise a b2b model. Also, the 4 P’s model is well established and accepted in business and marketing literature. Therefore, this project will employ the 4 P’s model, to provide continuity with accepted business practice. To align better with lean startup methodology there with a focus on solutions when marketing the product and value relative to price as suggested by the SAVE model.

1.6 Research Overview

The primary research conducted as part of this project has been broken down into two studies. The insights from the first study informed the design of the next, and

therefore a full analysis of the first study will be presented before moving on to the next. Given the explorative, and ultimately practical, nature of this project, a pragmatic methodological approach was taken. This approach holds that quantitative and qualitative methodologies each have strengths and weaknesses and the research questions are best addressed on a 'best-fit' basis (Pistrang & Barker, 2012).

The first study was exploratory and involved interviewing a range of stakeholders in the youth tennis market, primarily relating to their problems and existing solutions to these. This study was intended to provide direction to the project as a whole and was conducted in an expedient manner which required some validation, intended to be provided in the subsequent study.

Following this, a survey was conducted among a convenience sample of undergraduate psychology students in order to validate the interview findings across a larger group. This study further examined the area identified in the first study interviews, as well as testing the validity of the findings. Furthermore, this study extended the research to sport *in general* in order to test if any potential solution could be applied to sports beyond tennis which would further enhance the commercial viability of the project. Following these studies, a literature review of both theoretical and empirical research was conducted into the areas identified as relevant in these first two studies. The final study of this project investigated the youth athletes' preferences for types of technology that could potentially be used for a commercial offering. Features that were identified in the literature review were also tested for appeal and pricing.

1.7 Chapter Summary

This research set out to find solutions to the problems experienced by athletes in order to create a compelling offering to the market. The principles of leading innovation writers were followed, conducting the research in a mode of exploration (Christensen, 1997) while always considering value as perceived by consumers (Ries, 2001) in a well-defined market niche (Drucker, 1985). Within this framework the research principally considered existing problems and potential offerings utilising academic knowledge, which was then transferred into pragmatic solutions informed by the extensive research undertaken. The ultimate goal was to work towards creating an innovative product that helps youth tennis players to fulfil their ambitions, and additionally, could be applied to other human pursuits to help meet the needs of a wider audience.

Chapter 2:

Study One - Exploratory Interviews

With a number of wide-ranging opportunities already identified, as well as the possibility of unforeseen opportunities, this initial study was conducted as an exploratory study. The intention was to complete the study in a timely manner to provide some direction to the project as early as possible. This was to allow for a sufficient time span to research the relevant areas identified. The primary focus of this study was to identify existing problems and the solutions to these problems perceived by the key stakeholders. Other research topics included motivation, technology usage and stakeholder visions for this project. All of this research is considered in the context of identifying a commercially viable product or service at the conclusion of this project.

Motivation has been identified as an important concept to this project because increasing motivation is likely to lead to enhanced athletic development through increased training volume and intensity (Rottensteiner, Tolvanen, Laakso, & Konttinen, 2015). A highly influential motivational theory is applied behaviour analysis (ABA), the study of behaviour from a psychological perspective. It consists of two major areas; classical conditioning and operant conditioning.

Classical conditioning is the process of pairing two stimuli (an unconditioned and conditioned stimuli) together by presenting them to a subject at the same time. Following the pairing process the response to the unconditioned stimuli will be the same as the conditioned stimuli. For example, the ringing of a bell is paired with food. After conditioning the ringing of the bell will produce salivation. Operant conditioning is a process where consequences of behaviour are manipulated in order to change the rate of responding (for review see; Staddon & Cerutti, 2003). The naturally occurring contingency of praise and attention could be considered to reward the behaviour of

training. This is an example of positive reinforcement. Positive reinforcement is when a consequence is added and the rate of the targeted behaviour increases (Domjan, 2006).

A more recent development in the field of motivation is self-determination theory (SDT) which assumes humans are active participants in their environment, and also that the environment will either facilitate or impair motivation (Deci & Ryan, 2000). Three innate needs are considered to drive behaviour. They are; relatedness, the need to form social connections with significant others; competence, the ability to act with efficacy; and autonomy, the need for freedom to act at one's own direction (Deci & Ryan, 2000). SDT has considerable evidence in the literature (for a review see: Sun & Chen, 2010) and represents a more nuanced approach to motivation than ABA, as such this project will apply an SDT lens to motivation.

Furthermore, unlike ABA, SDT distinguishes between extrinsic and intrinsic motivation. Intrinsically motivated behaviour is typified by an activity that is inherently enjoyable and engaging, such as the play of young children (Deci & Ryan, 2015). External regulation of behaviour utilises rewards or punishments to influence behaviour. Perception of external regulation is important to the impact on intrinsic motivation. If the purpose of reinforcement is perceived to be controlling behaviour then this is in direct conflict with autonomy, and intrinsic motivation to perform that task will decrease. However, if the reinforcement is viewed as conveying information about competence then this will increase intrinsic motivation. (Deci & Ryan, 2015).

The objective of this project was to produce a piece of technology to assist the athletic development of youth tennis players and, as such, it is important to also understand attributes for technology adoption. The main contributor to the acceptance of new computer systems is perceived usefulness, and a secondary contributor is

perceived ease of use (Davis, Bagozzi, & Warshaw, 1989). This research highlights the importance of conveying the usefulness of any market offering, first and foremost, while also ensuring it is easy to use.

Another important consideration of technology adoption is network effects, where users are connected through relationships, and the benefits of the product increase as connections in the network increase (Pontiggia & Virili, 2010). Network effect could be relevant for this project if users interact with each other through the eventual product or service. As members of a training group adopt a commercial offering it will create greater benefits to others within that training group to join. Furthermore, as multiple training groups within a region join then this will increase the benefits to other youth athletes in that region and they will be more likely to join as well.

As noted earlier, throughout the project, it was important to consider potential offerings to the market. In order to help guide this process, participants were each asked what product they would create if this were their project. The responses to this question helped shape direction and provided an insight into the domain of problems and the types of technology stakeholder perceived relevant to this project. This allowed the project to maintain direction on a path to commercial viability and increased the potential for multiple ideas to be infused together to produce a superior product or service. This was tested in each of the market validation studies and ultimately utilised during the product validation process.

The focus of this project is assisting the development of youth tennis players. Therefore, the stakeholders to be consulted in this study are those critical to the development process. Athletes are at the centre of the development process, represent

the users of any potential offering, and are therefore critical to the success of the project. While youth players are the end-users, parents are the customer for any potential offering and it is important to understand the problems from their point of view, as they will be financing any purchases. Coaches are a key stakeholder in the youth tennis market as an educator to the athletes. To help understand the market, therefore, the three key stakeholders were consulted; athletes, parents and coaches. No further stakeholders were hypothesized to be vital to the athletic development process, though we were open to the possibility that additional stakeholders might be identified in this process.

2.1 Methodology

2.1.1 Participants

There were a total of 13 participants in this study, 12 were stakeholders from the youth tennis market (four athletes, five coaches, three parents) and one additional participant who was an athlete in the youth ten-pin bowling market. This further interview was conducted at the end of this study. As the interview data was collected it became apparent that the major problems described by the participants were not tennis-specific and this interview was conducted to investigate whether athletes in other sports faced the same problems as those identified through tennis networks. Each participant has been given a pseudonym and their backgrounds are summarised below.

Athletes; the sample of athletes involved in tennis is evenly split between males and females, as are tennis competitors, globally (International Tennis Federation, 2018). The athletes all continued competing in their sport following the end of their

junior career and achieved a relatively high level of success with sustained participation.

Serena has played tennis for approximately 10 years, including as a regional representative level in New Zealand as both a junior and senior athlete. She was ranked in the top 20 for her age nationally and is currently competing in a United States collegiate tennis league.

Roger has been playing tennis for approximately eight years and played to a regional representative level in New Zealand as a senior athlete. He was the top-ranked player at his high school and has done some part-time tennis coaching. He is currently competing in a premier club competition in New Zealand.

Marina has played tennis for approximately seven years and played to a regional representative level in New Zealand as both a senior and junior athlete. She was ranked in the top 10 for her age nationally and is currently competing in a United States collegiate tennis league.

Brad has played a range of sports over a ten-year period and has focused exclusively on tennis for approximately five years, playing to a top club level. He is currently competing in a United States collegiate tennis league.

Björn bowled competitively for approximately 15 years and has been ranked among the top New Zealand male ten-pin bowlers. He has won both age-group and open grade national titles. He is no longer bowling competitively.

Parents; the sample included two mothers and one father.

Steffi has one daughter who competed in tennis to a representative level and another daughter who competed in tennis, netball and rowing at a club level.

Judy has a son and a daughter who both competed in tennis to a representative level.

Michael has a son who competed to a representative level in tennis and basketball and a daughter who competed to a club level in tennis.

Coaches; all participants were male, this is due to the relatively low number of female coaches in New Zealand. Globally, approximately 80% of professional tennis coaches are male (International Tennis Federation, 2018) so while this sample is lacking any female participants, it is not atypical of the tennis coaching population.

Kevin has coached tennis for six years full time. His coaching is predominantly with beginner and club level players aged 6-14 years.

Jimmy has six years of full-time coaching experience as well as three years of coaching part-time. His players are aged 8-16 years and he coaches an even mix of club players and performance players.

Pete played tennis since he was five years of age and have been coaching full time for eight years. He coaches players aged 10-23 years and mostly works with performance players.

John has coached five years full time and another five years part-time. He started playing when he was eight years of age and was a highly rated New Zealand junior player. He works with players aged 10-14 years at a club level.

Andre started playing tennis as a five-year-old and has represented New Zealand as a junior. He has been coaching full time for 15 years. The players he works with are aged 10-16 years and he only works with performance level players.

2.1.2 Materials

The study consisted of interviews (see Appendices A and B for interview schedules) conducted over the telephone. The interview schedule consisted of the following sections; background, development process, motivation, technology usage and project vision. The questions were designed to explore the areas in order to assess the possibility of developing a commercially viable product or service.

2.1.3 Procedure

The participants were recruited through professional networks. Each participant was interviewed on the telephone, which took between 20 and 40 minutes, with notes taken during the interview. Verbatim sentences were recorded whenever possible. At the conclusion of the interview, the notes were read back to the participant to verify accuracy and understanding.

At the conclusion of each interview, the responses were coded and summarised to identify new information. Stakeholder interviews continued until the point of 'saturation' was reached, that is, when there was little pertinent new information obtained (Braun & Clarke, 2013). One further, and final, interview was conducted with a stakeholder from outside the youth tennis market in order to investigate if the results obtained may generalise to other youth sports.

Thematic analysis was used to analyse the problems identified by participants. Firstly, potential themes were identified in the data and then interviews were coded (Braun & Clarke, 2013). Once this was completed the themes were further revised to best represent the data.

2.2 Results

2.2.1 Athletic Development Stakeholders

In order to determine the most important stakeholders in the youth tennis market, each participant was asked to identify the roles involved in youth tennis development. Table 1 summarises the rate of identification of each role, with coaches and parents the only roles to be identified by all participants.

Table 1 <i>Stakeholders identified in the development process</i>	
Stakeholder	Frequency (%)
Coach	100%
Parents	100%
Sports club	38%
Sports Association	38%
Athlete	31%
Sport psychologist	31%
Friends / peers	23%
Physiotherapist	23%
Physical trainer	23%
School	23%
Other coaches	8%
Proshop staff	8%

2.2.2 Problems and Solutions

The problems and solutions discussed by athletes will first be considered, followed by the problems and solutions of the parents and coaches. The first theme that emerged for the athletes was a lack of perceived improvement. Serena talked about “not improving as fast as before”, explaining later that when she first started she felt she improved quickly and easily, but as she played more she found herself plateauing at times, and, when she was improving it was not as quickly as she perceived it to be initially. Similarly, Brad explained one of his biggest challenges was around “when it feels like you are not improving”. This is an interesting challenge, as it is subjective, Brad even alludes to this when he is talking about ‘feeling’ like he is not improving rather than an objective lack of improvement.

Motivation was the next theme to emerge as a problem for youth tennis players. Marina described her greatest challenge as “staying engaged and working hard especially when there are other things going on in your life” and Roger explained “A lack of motivation catches up with you. When you aren’t feeling motivated you train less and then your results get worse and you feel even less motivated”.

Closely linked to motivation, discipline also emerged as a theme. Roger stated he “didn’t take (tennis) seriously enough when he was younger” and Brad talked about a lack of discipline being a challenge and the temptation to skip stretching and ignore nutritional advice.

Another theme to emerge involved dealing with losses in competition. Brad said “when you are not winning you start to question what you are doing”, Serena listed “dealing with losses” as one of her biggest challenges and Roger discussed a lack of motivation after bad results in his quote above. These problems are likely to be

intertwined with both a lack of motivation as well as a lack of perceived improvement. The question was posed to participants as a singular challenge but Serena, Brad and Roger all gave two answers which also suggest the participants also consider them to be interrelated.

Solutions to these problems tended to be unique for each participant, with Serena choosing to “talk to coaches or other players”, Marina “staying positive” and “creating separation between tennis and other parts of my life”, while Brad sought “reassurance from my coach and friends” as well as changing training partners. Roger employed a more introspective approach “thinking of why you are doing it”. While no data was collected on the perceived efficacy of these solutions it can be inferred that the participants were not satisfied with the outcome, as they cited these problems as being the most significant during their junior careers.

The interview with Björn yielded some unexpected insights. He did not report any of the sorts of problems that other athletes reported. His challenges revolved around the repetitive nature of his training describing “It can be hard to maintain focus. Training can be really repetitive and it’s just not that exciting”. His solutions to this were to “break up training and do something fun” and “reward yourself after training with some little competitions with your friends”. While boredom with training can be seen as a motivational issue, the responses did not have the same intensity in either tone or content as the tennis players. It is important to note that when discussing roles and responsibilities of the development process, Björn revealed that he worked with a sport psychologist as part of the support he received from High Performance Sport New Zealand.

The interviews with parents identified psychological challenges as well as relationship management with coaches as a challenge. Steffi spoke about the most challenging aspect of athletic development was dealing with “horrible coaches” and went on to say that “the relationship with coaches is really challenging”. She also talked about an internal conflict given that she “personally really enjoy having kids in sport” as well as, lastly, citing “the mental stuff” as a challenge with one of her daughters. Judy described her biggest challenge as the “emotional side” and talked about how it is “hard knowing what to do”. She stated that she found it hard to watch matches because of the emotional outbursts from her children. She talked about a lack of communication around injuries as being another challenge as well as the cost of sport but qualified that it was a challenge “to a lesser extent” than the other factors. Michael discussed relationships management with coaches as well and his “expectations that parents have for coaches, and coaches for parents” as being a challenge. He also talked about the challenge of helping his child with “the ups and downs, going to tournaments, winning and losing”, which also suggests this project should focus on sports psychology.

Further reinforcing the desire for assistance with sport psychology support when asked what these parents would if it were their project, Steffi proposed a mobile phone application to “help players believe in themselves and be more positive”. Judy suggested she would “focus on the mental side” stating it was “really hard to crack” and “always ongoing”.

The first theme for the market problems that emerged during the analysis of interviews with coaches was one of managing expectations and boundaries with parents. Kevin explained he had challenges with parents because of a lack of realistic expectations, as he put it, “the difference in expectations and reality”. Jimmy talked

about a similar problem with “parents overstepping the mark and getting too focused on results”. Pete simply listed “parents getting too involved” as one of his biggest challenges as a coach.

The next issue that was raised by the coaches was communication with, and gaining compliance from, the athletes. Pete talked about the challenge of “players not listening” and John explained one of his biggest challenges as “trying to find the best way to communicate with the (athlete)”. Athlete motivation was raised by two coaches; Andre expressed his dismay at “the level of apathy (of the athletes) toward improvement” and John also talked about the challenges he faced working out “how to motivate (athletes) as an individual”.

When discussing solutions Jimmy explained that coaches “need to show you are making progress (to the parents)” to deal with parental expectations. Pete explained that he felt “communication is key” when it came to relationship management with parents. Jimmy went as far as to stop coaching some athletes in some instances and had direct conversations with parents other times but felt it is “difficult and risky” for the relationship. Other times Jimmy ignored the problem entirely but that “hasn’t been the best outcome for the player”. When faced with unrealistic parental expectations Kevin went with a strategy to “go along with it” because “it’s too hard to tell parents it’s not achievable”.

Coaches looking to address issues relating to motivation employed multiple solutions, John initially went with “trial and error” starting with “what’s worked before” but now chooses to “listen to the parents”. Andre talked at length about solutions he has tried explaining; “I have tried having high standards and pushing hard and both have gone badly” and later; “I tried being relaxed and letting them learn but that doesn’t

work” before talking about a proposed future strategy; “Next I am going to try building the right environment and using the gym to engage them physically”.

2.2.3 Sources of Motivation for Athletes

Three common sources of motivation for youth athletes were identified as a desire to improve, friends and socialising, and enjoyment of competition (see table 2). Other, less frequent, sources of motivation included reinforcement, intrinsic motivation and parental control.

Table 2 <i>Sources of motivation for youth athletes</i>		
Motivation	Participant	Extract
Desire to be better	Marina	“I wanted to be good”
	Björn	“I wanted to compete for the championship”
	Roger	“I wanted to win more”
Friends and socialising	Marina	“My friends played”
	Brad	“I liked playing with friends”
	Roger	“I enjoyed going on trips”
	Björn	“I enjoyed going away with other kids”
Enjoyment of competing	Brad	“I enjoyed competing - winning and losing”
	Roger	“I enjoyed playing well and being competitive”
	Björn	“I liked the competitive side”
	Marina	“I liked competing with others”
	Serena	“I liked competing”

Parent control	Björn	“At first, my Mum forced me, it was just what we did”
Intrinsic motivation	Brad	“My mum took me to the tennis court and she made it fun”
		“I liked staying active and getting outside”
Reinforcement	Serena	“When I first started I got lollies from my coaches for winning games”

2.2.4 Technology Usage

All athletes used at least one piece of technology in conjunction with their sport, data was collected on reasons for the choice, likes and dislikes of the technology (presented in table 3 below).

Table 3 <i>Technology choices for youth athletes</i>				
Athlete	Technology	Reason for choice	Likes	Dislikes
Serena	Runkeeper: A run tracking mobile phone application	Coach chose it	Easy to use. You can get statistics immediately	Too many notifications. Doesn't work in the gym.
Marina	WhatsApp: A mobile phone application for messaging	Training squad uses it	Easy way to communicate	None
Marina	GroupMe: A mobile phone application for messaging	The team uses it	Easy way to communicate	None
Brad	Runkeeper	Coach directed	Being accountable for fitness	None

Brad	Youtube videos	Coaches encourages	Easy way to watch top players	None
Brad	Push up mobile phone application	Self selected from option on app store	Keeps you working hard	Some were fiddly. Sometimes are to find what you want
Brad	WhatsApp	Training partners use it	Quick to communicate	None
Brad	GroupMe	Team uses it	Quick to communicate	None
Roger	WhatsApp	Everyone in my squad uses it	Easy to use. Works well	None
Björn	Youtube videos	Found some videos myself and others came from other bowlers	Good way to watch bowling videos	None
Björn	Video analysis	Other bowlers helping me	Improved my timing, technique and posture	None
Björn	Speed gun	Self-directed	Good for maintaining consistency	None

2.2.5 Proposed Offerings

Table 4 summarises the proposed offering from the participants. At the conclusion of the interview participants were asked “If this were your project, what would you do?”, three participants were not able to provide a suggestion (e.g. “I really don’t know” - Marina).

Table 4

Proposed offering from interview participants

Participant	Proposed offering
Serena	Something with videos for technique and stats to track yourself over time
Brad	An app, possibly using video, to track what happens during a match
Steffi	An app to help players believe in themselves and be more positive
Judy	Anything to do with the mental side
Michael	An app to track your progress on things like fitness, health, scheduling, coaching, even costs.
Kevin	Video analysis app to compare players with a pro and improve their technique
Björn	An app to track technical variables in the sport as well as sleep and nutrition so you can create the perfect routine
Jimmy	An app comparing students to top 50 players
Pete	A digital journal with all training stats, goals, lessons, matches that coach and parents can view
John	An app to send messages to players following up on what was done in the lessons

2.3 Discussion

The purposes of this study were used to provide direction to this project, as well as testing some initial hypotheses. The primary outcome of this study was to move the project toward the field of sport psychology. The American Psychological Association (2003) definition specifies the application of psychological knowledge to enhance both

the performance and well-being of athletes. This project continued to investigate both constructs in study two as well as in the literature review that followed.

While both performance and well-being are likely to both be important to parents and coaches, well-being appears to be the primary concern for parents (e.g. parents discussing concerns around emotions of players) while coaches appear to focus more on performance (e.g. coaches talking about motivation and improvement). Athletes discuss challenges relating to both performance (e.g. the focus on improvement) and well-being (e.g. dealing with losses). These insights could be utilised while marketing the product, information created for parents could focus on well-being, coach-targeted information could focus on performances and information for athletes could feature both well-being and performance messages equally.

A further significant finding was that communication and relationship management between parents and coaches was identified as a challenge for both parents and coaches. Providing a means to reduce this problem in a commercial offering would likely drive support from both parents and coaches. In addition to communication, an educational component for parents and coaches could help reduce some of the challenges they have when trying to help youth athletes with psychological challenges.

The range of solutions provided by participants were relatively unique to each athlete interviewed (e.g. self counselling, reassurance from others, positive mindset, the introduction of rewards). Therefore, it was decided that it was best to investigate the existing solutions in the next study utilising open-ended questions, included as part of a survey. With a larger, more diverse, sample size in the next study it was hypothesized that themes would emerge during the analysis.

The results supported the hypothesis that parents and coaches are the most important stakeholders in youth athletic development. Both coaches and parents were identified as stakeholders in youth tennis development. All participants identified coaches and parents as part of the youth tennis development process. However, only a third of participants identified youth athletes as being part of the development process. It is assumed that this is an oversight of many participants as the athlete is the focus of the process; without an athlete, there is no development process. Potentially, the question may have been inadvertently directed participant to focus on support roles. While identifying coaches as an important stakeholder, the hypothesis that tennis coaches were a key influencer in technology purchases for youth tennis players was only partially supported in this study. Some participants identified coaches as an influence on technology choice, but not all. This could be due to a general lack of technology usage that would directly involve a coach and requires further investigation.

When considering SDT both competence (e.g. "I wanted to be good" - Mariana) and relatedness (e.g. "I liked playing with friends" - Brad) were present. Enjoyment of competition was a theme for the athletes and this is likely to be a combination of both competence (with wins and losses providing feedback from the environment regarding your ability) and relatedness (matches involve a degree of cooperation with most youth tennis matches self-umpired). Brad provided some examples of intrinsic motivation where the activity of sport of enjoyable in itself. External motivation was present with control from parents (Björn) and reinforcement with confectionary (Serena). Controlling behaviour is a suboptimal strategy as it undermines autonomy and therefore reduces intrinsic motivation (Deci & Ryan, 2015). Interestingly, Björn was the highest achieving athlete in the sample so SDT would suggest it is likely his parents

shifted away from this strategy over time. Reinforcement as described by Serena (receiving confectionary for performing well) would have likely to enhanced intrinsic motivation as long as it was seen to provide feedback on competence rather than controlling behaviour (Deci & Ryan, 2015).

The findings on important characteristics of technology use are consistent with previous research by Davis, et al. (1989). Functional utility of the technology was a primary concern of the participants, while some also referenced ease of use, suggesting it was a secondary concern. In line with Pontiggia and Virili (2010), network effects appear to be present with many participants citing the reason for their choice, particularly for communication applications, as peer usage. These aspects will continue to be considered throughout this project, particularly in the product development phase.

A further outcome from this study is that the project was initially focused exclusively on youth tennis players, however, it appears likely that the problems identified are not unique to tennis as a sport. While tennis has particular technical and tactical challenges, the psychological challenges seem to be more generic. The additional athlete interviewed did not provide support for this hypothesis but there was a potentially confounding variable of sport psychologist usage - this athlete was already potentially 'compensating' for the psychological challenges. This an area for further investigation as it will have a significant impact on the commercial viability of the project.

2.3.1 Limitations

The limitations of this study were numerous, but each was carefully considered when designing the project as a whole. Firstly, there was a non-random sample: Participants were sourced through the lead researcher's professional network. This will be addressed with the use of a more representative sample in study two.

Secondly, there is a potential for survivorship bias (a selection bias whereby focusing on 'surviving' participants skews results; Etzel, 2003) with all athletes interviewed continuing to compete in their sport beyond their junior career. The sample in this study may have addressed, and overcome, alternative challenges that have resulted in their continued participation in youth sport. Therefore, it may be possible that the findings here are misrepresentative of the challenges faced by youth athletes in general. To mitigate this, the following study includes athletes that have continued their chosen sport *and* others who have ceased to compete, thus, including 'survivors' and 'non-survivors'.

Telephone interviews were conducted, and analysis based on detailed notes. It would have been ideal to conduct the interviews face to face and record and then transcribe the interviews but this was not done in order to progress to an MVP in an as efficient manner as possible (as recommended by Ries, 2011). To mitigate any risk, the following study was used to corroborate the findings in this study.

A final consideration was the decision to use athletes at the end of their junior career rather than interviewing current junior athletes. This was a deliberate choice in order to gain the perspective of stakeholders when considering their junior career as a whole rather than partially completed. Youth athletes may also experience a 'recency

effect' inflating the perceived importance of problems they are currently, or were most recently, facing.

2.4 Chapter Summary

This study identified sport psychology as a primary concern for stakeholders in the youth tennis market. A secondary concern is relationship management and communication, particularly between parents and coaches. While this study has provided direction to the project, many of the findings need to be validated or explored further in order to strengthen the conclusions.

Chapter 3:

Study Two - Market Validation Survey

The objective of this study was to expand on the research conducted with athletes in study one. This project is focused on developing an offering to assist in the development of youth tennis players. Therefore, the most important ‘stakeholders’ of this research are youth athletes and the challenges they face. As the users of any technology-based offering, the value must be considered from their perspective (Ries, 2011) and the adoption of any new technology is dependent, first and foremost, on the perceived usefulness of the technology (Davis et al., 1998). In order to ensure this project meets the original objective and creates a commercially viable product, the athletes’ perspectives must remain the focus of this project.

Problems faced by youth athletes (as identified in study one) are; motivation, discipline, perceived progress and dealing with losses. These problems were identified in youth tennis players but appear likely to be present in other youth sports. It is important to investigate this potential utility outside the tennis market, as it will have a significant impact on the commercial viability of any market offering developed at the conclusion of this project. While the results from the previous study do not suggest these problems are present in other sports, there was a confounding factor of sports psychologist usage. Therefore, the present study included participants from a range of youth sports in order to test the results obtained in the previous study and if they can be generalised across youth athletes in other sports.

This project will adopt the definition of sport as outlined by the European Sports Charter; “all forms of physical activity which, through casual or organised participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships or obtaining results in competition at all levels” (Council of Europe, 1992,

Article 2: 1a). This definition will be used to assess if an activity will be included in this project as a sport.

The problems identified by the research so far appear to fall within the domain of sport psychology. As this project is taking a lean start-up methodology, where the efficient progression to the MVP stage is emphasized (Ries, 2011), a full review of sport psychology is not warranted unless the findings of the previous research in this project are validated.

However, a cursory examination of research into sports psychology that is available to the general public reveals that an apparent panacea for psychological challenges in sport is goal setting. Various websites describe goal setting in categorically positive terms; “an absolutely indispensable part of the sport training process” Israetel (2015); “an extremely powerful technique for enhancing performance” Harrison (2013); “a means to boosting motivation and focusing your team's collective minds” (Hinch 2016). The prevalence of goal setting means it can be used as a test case for identifying the stakeholders involved in sports psychology for youth athletes, providing an insight into key influencers.

Furthermore, it is interesting and pertinent that Study One identified that youth athletes are struggling with the types of problems that an entire field is devoted to addressing. By considering the work of Davis et al. (1989) on new technology adoption, sport psychology could be viewed as a ‘technology’ and the lack of adoption in the market could be due to a lack of perceived efficacy. Also, financial cost is often a barrier for consumers (Barker & Winter, 2014) and sport psychology professionals may be perceived to be too expensive in the market. The reason(s) for a lack of engagement with sport psychology is investigated in this study.

Three prevalent themes regarding motivations for youth athletes were identified in the first study of this project. They were; a desire to be 'good', enjoyment of competition; and, friends or socialising. When considering the desire to be good this is likely made up of two components; being a good performer and improving. When discussing challenges, participants often referred to improvement (one of the themes for the greatest challenges perceived by youth athletes in a lack of perceived progress) so this is likely a strong motivator. Therefore, this theme will be split into two components of performance and improvement.

While the themes show the importance of competence and relatedness from SDT, autonomy is largely missing from the data, and, it is important to consider why because it is a key component of SDT. This may be due to a lack of insight from participants when autonomy is present (i.e. they only notice when autonomy is missing). One of the participants discussed being forced by his parents, although this did not appear to have a negative impact on his sporting participation or performance it identifies a way to measure autonomy in this study. As such, autonomy will be assumed to be present unless participants identify an external controlling influence (such as a parent).

In order to test if there is an influence of survivorship bias in the data, sporting history and level of play will also be recorded. Survivorship bias could be important, as individuals may drop out of sport for particular reasons, while 'surviving' athletes are experiencing different problems. There are more athletes at lower levels of sport, making this a more fruitful place to concentrate on commercial activities.

As in Study One, participants will be asked about potential offerings, in order to build a more complete picture of the types of solutions envisioned by athletes. These will then be used to inform decision making in the product validation process.

3.1 Methodology

3.1.1 Participants

A total of 269 participants were included in the analysis of this study. They took part in the online survey, drawn from a first-year undergraduate psychology course at Victoria University of Wellington. The participants mostly competed in team sports (70%) rather than individual sports (30%), the complete list of sports is attached as Appendix C. More respondents no longer participating in their primary sport (73%) than those who are still participating (27%).

Most participants reported their youth sporting participation as spanning five or more years (67%) with a roughly even distribution of participants over shorter durations; four years (12%), three years (8%), two years (9%), and one year (4%). Youth sporting engagement was mostly at a club or school level (55%) followed by regional representative (24%), social (15%) and the participants who reached a national representative level comprised 6% of the sample.

3.1.2 Materials

The online survey (Appendix D) created and administered using Qualtrics software, was developed based on data obtained during the interviews in the previous study. Answers were provided in the form of multi-choice, Likert item or text box as appropriate. Where multi-choice options were presented to participants, an option was present for participants to submit a unique response.

Questions were asked regarding; sporting background (e.g. primary sport, level achieved); motivation (e.g. reason for competing); problem and existing solutions (e.g. greatest challenge; actions taken to mitigate this challenge, effectiveness of those

actions); sport psychology engagement (e.g. sport psychology usage, reasons for not engaging with sport psychologists); vision for this project (e.g. advice for young athletes, product or service participants would create).

3.1.3 Procedure

All students in the first-year psychology course at Victoria University of Wellington were invited to consider participation, with an explicit requirement that they should have participated in youth sport. This is a convenient sample and represents a relatively diverse range of university as approximately a quarter of all first-year students enrol in this course. After a preliminary analysis of the dataset ten participants were removed due to ineligibility (did not participate in any youth sports) and seven for incomplete responses, leaving a total of 269 participants included in the analysis.

Thematic analysis (Braun & Clarke, 2013) was conducted on each of the open-ended questions. SPSS was used to complete the statistical analysis and Microsoft Excel was used to produce graphical representations of the data. Likert item responses for solution effectiveness was converted to a numerical value (e.g. “extremely effective” = 1, “very effective” = 2). This created an ordinal value for the responses and a Kruskal-Wallis test was used to determine group differences. The Mann-Whitney U test was used for pairwise comparisons where the Kruskal-Wallis test indicated a significant difference at $p < 0.05$ significance level.

3.2 Results

3.2.1 Motivation

An SDT lens was applied to sources of motivation for participants sporting participation. It was found that sources of competence (81%; e.g. “I was successful”) and relatedness (74%; e.g. “Friends”) were cited. Participants that cited pressure from others to continue (29%; e.g. “Older sibling wanted me to”) were regarded as lacking autonomy. Intrinsic enjoyment of the sport (5%; e.g. “loved the sport”) and other reasons (7%: e.g. “Duke of Edinburgh”, “I’m competitive” and “stress outlet”) were also reported.

3.2.2 Reasons for Cessation

A thematic analysis (Braun & Clarke, 2013) was conducted on the reasons for cessation for the 73% of participants who no longer compete in their primary youth sport (table 5 summarises the themes that emerged during analysis). The reasons for ceasing split amongst six themes; a loss of interest (32%), injuries (12%), lack of time (23%), prioritising university (12%), logistical challenges (15%) and social challenges within the sport (6%).

Table 5	
<i>Themes for reasons for cessation</i>	
Theme	Extract
Loss of interest	"Because as I got older I lost interest in the sport."
	"Just lost interest"
	"Got bored"
Injuries	"Back problems"
	"Injury and then just stopped"
	"Injury"
Lack of time	"Pursued other interests, took up too much time."
	"Because I don't have time"
	"Not enough spare time"
Prioritising university	"Too much uni work!"
	"To make more time for [my] study"
	"Because I moved away from home and study takes up all of my time"
Logistical challenges	"The process to sign up at uni is too complicated"
	"Difficulty of finding teams to play with once leaving high school"
	"Missed sign up one season so stopped playing"
Social challenges within sport	"Overcompetitiveness/Jock culture"
	"I quit through coaching difficulties in year 13 and haven't picked it up since"
	"I decided I would rather hang out with my friends on a Saturday rather than play netball"

3.2.3 Problems and Solutions

Participants reported that their biggest challenges during their youth sporting career were generally in a psychological (93%), rather than non-psychological (7%) domains. Examples of non-psychological problems are injuries, non-selection, a lack of ability. The following analysis of problems and solutions only included participants in the psychological domain group.

The reported psychological challenges aligned with the themes identified in study one (motivation; perception of progress, discipline, coping with losses) with only 3% of participants reporting ‘other’ problems (e.g. “over-competitive teammates”; “coach being unfair”). The most prevalent problems reported were maintaining motivation and a lack of perceived progress. Table 6 summarises the greatest challenges reported by participants and solution effectiveness for each problem.

Table 6 <i>The biggest challenges faced by participants and solution effectiveness</i>		
Challenge	Frequency (%)	Mean rank solution effectiveness (lower is more effective)
Maintaining motivation	35%	135.72
Feeling like you aren’t progressing	33%	116.64
Dealing with losses	15%	115.93
Maintaining discipline	9%	114.57
Other	8%	135.71

The reported effectiveness responses were each assigned a number from one to five with one representing the most effective and five representing least effective on the Likert item used in the questionnaire. To assess if the differences between groups for the effectiveness of the solutions to these problems are statistically significant a Kruskal-Wallis test was conducted. There was no significant difference of solution effectiveness found between the different problems; $\chi^2(4) = 4.930, p = 0.295$.

A thematic analysis (Braun & Clarke, 2013) was conducted on the solutions employed by participants. Six distinct themes emerged during the analysis with 7% of responses assigned to an 'other' category (see table 7 for a summary of themes).

To assess group differences a Kruskal-Wallis test was used and a significant result was obtained; $\chi^2(6) = 83.441, p < 0.05$. In test where statistically significant group differences pairwise comparisons were made using the The Mann-Whitney U test. Statistically significant differences were found between the no solution group and each of the other solution groups. No other statistically significant pairings were found. Table 8 summarises the solution employed by participants and solution effectiveness for each solution.

Table 7

Themes for existing solutions to problems for youth athletes

Theme	Extract
No solution	"No"
	"Not really"
	"Nah not really"
Maintain training	"Yes, I forced myself to turn up to every training and game"
	"I just kept at it till I got better"
	"I just did it"
Increase training	"Trained harder and more often"
	"Worked harder"
	"More practice"
Goal setting	"Made goals and plans"
	"Adjusted my mindset to simply focus on the task and present a miniature challenge"
	"Worked on weakness at training"
Social motivation	"Tried to play with friends to keep up motivation"
	"I would make sure I spent more time with my friends while playing netball to see if that kept me motivated."
	"Spending more time practicing with my brother"
Positive mindset	"Try to stay positive"
	"Focussed on enjoying myself"
	"Kept reminding myself how much I enjoyed it"
Other	"Self-Counselling"
	"Music"
	"Wore safety gear and made sure I was with at least one other person"

Table 8

Solutions to challenges faced by participants

Solution	Frequency (%)	Mean rank solution effectiveness (lower is more effective)
No solution	37%	166.06*
Increase training	19%	92.70
Social motivation	12%	95.31
Maintain training	11%	75.74
Goal setting	9%	87.02
Positive mindset	5%	66.14
Other	7%	102.83
Note: *p < 0.05 for all pairwise comparisons between the no solution group and all other solution groups.		

3.2.4 The Role of the Coach in Goal-setting

It was found that 77% of participants had used goal-setting in relation to their youth sport. Of the participants who set goals for their sport, 33% did it without assistance from anyone else. Most participants who were assisted were helped by their coach (64%), other stakeholders that helped with goal-setting were parents (26%), and peers (10%; e.g. “teammates”, “friends”).

3.2.5 Sport Psychology

Only 6% of participants had seen a sports psychologist and 9% had used sports psychology products. The barriers to engaging with sports psychologists were a lack of knowledge (14%: “What is a sport psychologist”), financial costs (19%), lack of perceived efficacy (12%). In regard to psychology products, the barriers identified were, a lack of knowledge (8%), financial costs (13%), lack of perceived efficacy (14%). In addition to these reasons, 2% of participants cited other reasons for not wanting to see a sport psychologist while there were no other reasons given for not wanting to engage with sports psychology products. The majority of participants perceived they did not need a sports psychologist (55%) or sports psychology products (65%).

3.3 Discussion

This study included a majority of participants from team sports rather than individual sports. Most of the participants are no longer competing in their primary sport. This provides a contrast with the sample of athletes in study one and allows insights regarding any findings that may have been particular to the sample in study one to be assessed. The majority competed for five or more years and reached either a club/school or regional representative level. Overall, this represents a good mix of participants relevant to this project and the findings will be applicable to the type of athletes the project is targeting.

Motivations reported for continued sporting participation included competence and relatedness, innate needs identified in SDT. However, as in study one, some participants identify a motivation for participating in youth sport as the control of others (usually parents). In light of SDT this may satisfy relatedness (compliance may

increase social connection with parents) but it also undermines autonomy, and thus, is unlikely to result in a net increase in intrinsic motivation. An educational component for parents has already been identified as a potential feature for a commercial offering and it is likely that youth athletes would benefit from the inclusion of SDT to this resource. This is further investigated in existing literature and presented in the following chapter.

With more than nine out of ten participants citing psychological challenges as the most significant during their youth sporting career, this provides further support for this project to investigate sport psychology literature. The findings in this study also support the hypothesis that psychological challenges may generalise across the majority of youth sports, rather than just tennis. This is important, as it provides strong evidence to pursue products in the sports psychology domain, as well as extending the potential market to youth athletes from all sports. Also, many of the reasons for ceasing competition are related to the problems identified (e.g. 'loss of interest' and 'lack of time' are both related to a loss of motivation) suggest there is no issue of survivorship bias in the sample from study one.

The most prevalent problems were a lack of perceived progress and motivation with the majority of participants citing one of these as their most significant challenge during their sporting career. Coping with losses and maintaining discipline were also present in the data, to a lesser extent. Solution effectiveness is not significantly different across these problems, suggesting that each problem is being equally well solved by youth athletes.

When looking at the solution effectiveness by solutions it was found that no solution was significantly less effective than any of the solutions employed by participants. However, there were no significant differences between the solutions as

long as a solution was employed. The most prevalent solution was to increase training, suggesting they are a preferred option for youth athletes. Any commercial offering that is able to assist youth athletes to increase their training volume is likely to be viewed positively by youth athletes. Goal-setting, maintaining training and social motivation were the next most prevalent solutions, suggesting they are also likely to be a popular solutions for youth athlete.

A question that this study attempted to clarify from study one is whether coaches are key influencers in this project, or just a stakeholder. This distinction is important because it reflects the level of impact the views of coaches will have on the success of a commercial offering. Goal-setting was prevalent in the participants, supporting its use as a 'test-case' for coaches influence on sport psychology processes. Coaches assisted the majority of participants who were assisted with goal-setting. This provides support for coaches continued inclusion as key influencers in the youth athlete market and will continue to be a consideration in this project.

In analysing the responses to what participants would do if they were to create a commercial offering for this project and the advice for youth athletes it was not possible to extract any meaningful insights. Many participants offered that they would create a "programme" with the type of programme remaining ambiguous. For instance, participants may have been referring to a computer programme, an online workshop or an in-person course. Advice offered to young athletes was often clichéd and of little value (e.g "do your best", "practice makes perfect"). It was determined, at this point, that a further study would be necessary to investigate reaction to offering. This study was conducted following the literature review, so that potential features could be identified and included in the study.

The findings pertaining to barriers to sport psychology use support the arguments made that perceived usefulness and financial costs would be barriers. However, lack of knowledge has been identified as an additional barrier. This was the most prevalent barrier to sport psychologist usage and there may be additional participants whose responses reflect a lack of knowledge. Despite 93% of participants citing their greatest challenge during their youth sporting career within the psychological domain, the majority of participants indicated they didn't need a sport psychologist or sport psychology products. This is likely to represent a lack of knowledge regarding the role and scope of sport psychology. Further research of sport psychology literature is presented in the next chapter. Given the similarities to this study and study three, limitations are discussed in the general discussion, chapter six.

3.4 Chapter Summary

This study supported the finding of study one that sport psychology challenges are a prevalent problem for youth athletes. Furthermore, it found that these problems extended to a wide range of youth sports. The most prevalent problems identified were a lack of motivation and a lack of perceived progress, other, less common, problems identified were a lack of discipline and coping with losses. A range of solutions were employed and the efficacy of each solution was not significantly different as long as any solution was employed. Coaches were found to be key influencers in the youth sports market for products and services related to sport psychology. Barriers to use for existing sport psychology products and services were found to be a lack of knowledge, a lack of perceived efficacy and cost.

Chapter 4:
Literature Review

This chapter discusses relevant literature in regard to the challenges identified in the previous studies. The findings of the previous studies in this project identify product-relevant factors that might be characterised as falling within the field of sports psychology. At this point in the project, I travelled to Orlando, Florida, to attend the annual conference of the Association for Applied Sport Psychology (AASP), the largest sport psychology conference globally. This conference provided an opportunity to gain an insight into current trends in sport psychology as both an applied and research discipline. The conference programme identified four areas of interest to guide attendees and one of these areas was youth sport (AASP, 2017), highlighting a current emphasis on youth sport in sport psychology, and the potential for the literature to assist with the problems identified in the current research project.

While the findings of this project suggest that an offering could be developed to assist youth athletes from all sports, it was decided to continue to focus on tennis. This is in order to maintain a clear market segment as advised by Drucker (1985). The generalisability of any successful offering to other youth sports is a significant benefit to the long term commercial potential of this project and will be discussed further in the business case.

This literature review will consider the problems identified earlier in this project beginning with a lack of motivation before focusing on a lack of perceived progress. Discipline and coping with losses are considered where appropriate, however, as they were less prevalent, less importance was placed on literature addressing these issues solely.

4.1 Motivation

Motivation continues to be a focus of this project and a continued SDT lens will be applied, where appropriate, during the review of literature through to product validation. However, there are elements of ABA that are congruent with SDT. For instance, both ABA and SDT frameworks hold that positive reinforcement would increase motivation to perform the targeted behaviour. Therefore, it would be useful to consider ABA interventions with reinforcement and how they might relate to this project.

4.1.1 *Applied Behaviour Analysis*

The application of ABA to the field of tennis is scarce in the literature, however, Buzas and Allyon (1981) used a behavioural intervention to improve tennis skill execution. The study used positive reinforcement of correctly executed skills in the behavioural intervention and allowed the coach to teach as they normally did in the baseline condition. The intervention group showed a significant improvement in skill execution over the control group which provides evidence of the suitability of tennis skill to be improved using ABA reinforcement protocols.

This could be incorporated into a product by assisting youth athletes to design their own ABA intervention using reinforcement to increase motivation. These interventions could be self-administered or parents and coaches could assist in designing them. It would be necessary to provide some background knowledge to users before guiding them through the design of a basic intervention.

4.1.2 Self-Determination Theory

SDT was a common theoretical underpinning of the studies presented at the AASP conference, reinforcing its utility for consideration in this project. Of particular relevance will be identifying ways to introduce one or more of the three innate needs identified by Deci and Ryan (2000); competence, autonomy and relatedness. Consideration will also need to be made not to undermine any one of these needs inadvertently.

Also, SDT has been used as a framework for developing interventions previously. For example, Silva et al. (2008) developed an SDT-based intervention to promote exercise by overweight individuals. They offered specific strategies to promote intrinsic motivation to exercise (e.g. give positive feedback, provide choice, use neutral language such as “could” instead of “should”). Each strategy is designed to promote competence and autonomy as discussed in chapter two (p.19-20). Van Stralen et al. (2008) developed a computer-based intervention “Active Plus” to promote physical activity using an SDT lens. The intervention used a website to provide information and a forum and ‘e-buddy’ to enhance relatedness. Peels et al. (2013) investigated the efficacy of Active Plus and found it lead to greater physical activity than a baseline group.

These studies provide insights into some design considerations and highlight the value of applying SDT principles to a computer-based product. The introduction of features to enhance relatedness could provide increased motivation for users. This could be incorporated into the proposed communication platform, that was primarily aimed at improving parent-coach relationships. A way for athletes to connect with one another from either inside or outside their training environment would achieve a greater sense of relatedness.

4.2 The Role of Parents and Coaches

During the project, youth athletes have been the focus as the end users of any potential offering, however parents and coaches are also important stakeholders - as the customers and key influencers, respectively. While parents and coaches were consulted in the first study of this research project, the second study exclusively surveyed athletes. Therefore, I consulted the research literature to further understand the views and roles of parents and coaches in the sport psychology process.

At the outset of this project I identified an offering in the domain of sport psychology as a potential opportunity. At that point I anticipated that this would be more likely to be accepted by coaches, as it does not encroach on their core domain of expertise, a position which was later supported by study one. Gould, Medbery, Damarjian and Lauer (1999) conducted a survey on youth tennis coaches' attitudes to mental skill training, identifying a range of findings that are relevant to this project. Firstly, junior tennis coaches perceived psychological skills training to be of high importance, and coaches reported that almost 80% of players they work with experience performance-limiting mental challenges. Similarly, a more recent study into the attitudes of coaches and parents toward sport psychologists revealed both coaches and parents consider sport psychologists to be beneficial to the performance and well-being of youth athletes (Thelwell, Wood, Harwood, Woolway, & Van Raalte. 2018). These studies align with the principal finding of this project - that many youth athletes experience psychological challenges in their sport. They also provide evidence for coach and parental support of a commercial offering in the sport psychology domain.

In addition to investigating support for mental skills training, and prevalence of psychological challenges faced by athletes, Gould et al. (1999) also examined barriers to youth tennis coaches providing mental skills training. The two largest barriers were found to be a lack of time during training, and a lack of interest from youth athletes. As such, the authors recommended development of resources that can be delivered in a 10-15 minute timeframe. This would reduce barriers for coaches and this insight is important to this project when developing an offering.

Another important finding from Gould et al. (1999) was that coaches rated the best types of resources as worksheets, videos and journals. At the time of this research the coaches would, most likely, have been referring to paper-based exercise form and journal, with DVD or VHS videos. These types of resources could now be electronic and delivered in a mobile website or application in a more efficient manner than these coaches would have envisaged at the time. This would also have the benefit of time-efficiency, further enhancing the offering from the perspective of the coaches.

A final finding of relevance to the current project was that approximately 60% of coaches reported parents interfere with psychological components of their children's tennis (Gould et al., 1999). This supports the finding in Study One that parents find it difficult to know how to help their children with psychological challenges. In order to address the negative impact that parents and coaches can have on youth athletes Smoll, Smith and Cumming (2007) developed workshops specifically for coaches and parents. They reported that, by training coaches and parents, youth athletes experienced less anxiety in relation to sport. Coaches were delivered a 75-minute workshop with a variety of topics outlined in Appendix E. Parents took part in a 60-minute workshop with Appendix F outlining the topics. This study delivered workshops to both parents

and coaches of athletes in the intervention group and neither in the control group so the relative contributions to the reduction of anxiety cannot be established.

Further to this, Jõesaar, Hein and Hagger (2012) investigated motivational climate for youth athletes from a range of individual and team sports, over a one year period. They found that coaches' support for autonomy, and social support from peers within a training group, predicted intrinsic motivation. Furthermore, coach support for autonomy predicted positive social support from training peers. This shows the value of educating coaches on the importance of autonomy for developing intrinsic motivation within their athletes as well as enhancing athletes' support of one another. Also, findings from studies one and two in this project identified parents as stakeholders that, at times, undermine autonomy and therefore, this educational component would be valuable for parents as well.

These studies show that both parents and coaches are likely to support an offering in the domain of sport psychology for youth athletes. They also identify some important traits that must be considered during product development, and provide a potential feature - that of an educational component for parents and coaches - to reduce youth athlete stress and increase intrinsic motivation.

4.3 Self-Regulation

The most prevalent challenges perceived by athletes in this research project were maintaining motivation and a lack of perceived progress. Other challenges included dealing with losses, and maintaining discipline. While each of these problems are distinct, they are also related in that they involve 'self-regulation'. For instance, a hypothetical, but illustrative, scenario might involve an athlete suffering a loss to an

opponent they usually beat, resulting in a feeling they are not progressing, which in turn reduces their motivation to train and leads to a lack of discipline. Essentially, these problems perceived by athletes reflect breakdowns of self-regulation, processes that enable behaviour toward a goal over time and across contexts (Karorly, 1993).

Self-regulation has been applied to many different areas including performing regular exercise (e.g. Milne, Orbell, & Sheeran, 1999), consuming healthy food (e.g. Baumeister et al.), attentional control (e.g. Drach-Zahavy & Erez, 2002) and delay of gratification tasks (e.g. Mischel & Ebbesen, 1970) which are related to successful athletic development. Importantly, the ability to self-regulate is a finite resource, becoming depleted as a person exercises it, and needs to be 'topped up' (Baumeister, Muraven, & Tice, 2000)

Adding further to the complexity, successful tennis players need to successfully regulate their behaviour over a significant timespan. Tennis players are recommended to begin training in excess of ten hours weekly when aged nine years (Tennis New Zealand, 2018) and peak more than two decades later, between 28 and 32 years of age (Weston, 2014). Self-regulation is appropriate for this age-range as it has been identified in children as young as four years (Macdonald, Johnson, Forsythe, Plante, & Munhall, 2012) while increasing with age (Gwyther & Holland, 2012). Interestingly, youth sport participation has been found to increase self-regulation (Erikstad, Høigaard, Johansen, Kandala, & Haugen, 2018) which suggests there are naturally occurring benefits to self-regulation for youth athletes. Therefore, the self-regulation literature was consulted in order to identify mechanisms that could be incorporated into a commercial offering.

In a review of self-regulation Karoly (1993) identified five stages of self-regulation; goal selection, goal cognition, directional maintenance, re-prioritisation and goal termination. This review follows self-regulation from goal selection through to goal attainment and considers specific mechanisms that influence both task performance *and* goal attainment.

4.3.1 Goal Selection

The first important step to achieving one's goals is to set goals such that performance is maximised. While this step is often overlooked in self-regulation literature it has a large influence on subsequent behaviour (Karoly, 1993). Goal-setting theory was developed by Locke and Latham (1990) based on a meta-analysis of over 400 studies. Specific goals were compared to 'do your best' type goals, showing that specific goals produced better task performance. Locke and Latham argued this was due to a wide range of acceptable performance levels with non-specific goals. For example, an individual aiming "do their best" may perceive they have achieved their goal even if they perform poorly on a given day because they are feeling tired. Conversely, specific goals clearly state what is expected and therefore goal attainment is easily determined. Furthermore, they found a positive linear relationship between goal difficulty and task performance, as long as limits of ability are not exceeded and commitment to the goal is present. Goal-setting theory is well supported in industrial psychology with Gellatly and Meyer (1992) describing it as "perhaps the most robust finding in the industrial and organizational psychology literature" (p. 694).

Goal-setting theory spawned the acronym "SMART" goals to summarise this research whereby optimal goal-setting is Specific, Measurable, Attainable, Relevant and

Time-bound. However, Rubin (2002) found that 75% of websites delivering the message of SMART goals to the public are using alternative interpretations of the acronym that are not always an accurate interpretation of the research (e.g. Simple, Meaningful, Accepted, Relative, Truthful). This shows a lack of accuracy from existing sources and highlights the potential for a well-informed offering to provide benefits to youth tennis players through accurate communication of research findings.

It is important to note that goal-setting theory deals with task *performance* rather than goal *attainment*. Greater task performance may not translate to greater goal attainment, particularly if goals are difficult. Logically, it is better to achieve at a higher level even if a difficult goal is not met, than achieve at a lower level and meet an easy goal. Therefore, when goal difficulty is manipulated goal attainment is not the best measure of self-regulation, but rather task performance. Some of the studies cited use goal attainment as a measure of self-regulation, and this is appropriate if goal selection is consistent. This project, however, is focused on task performance.

Goal-setting theory was initially developed utilising outcome goals, however, subsequent research has found learning goals to be useful in some situations. Seijts and Latham (2001) investigated the influence of goal selection on task performance when knowledge is incomplete at the start of the task. Participants were required to perform a class-scheduling task where high performance required discovery of new strategies. They found that setting difficult, specific learning goals produced the greatest task performance. While all sport naturally creates outcome goals for athletes, in tennis this is particularly strong with the head-to-head, individual nature of matches. Learning goals may be most appropriate for competing with an unknown opponent. At the start of a match, players may have limited knowledge and will need to dynamically identify

strengths and weaknesses of their opponent in order to maximise performance within the match. Learning goals focused on identifying correct strategy could be used during competition in order improve match performance and accelerate development.

4.3.2 Goal Cognition

The next step in Karoly's (1993) cycle of self-regulation is goal cognition. An important aspect of goal cognition is framing of goals. Drach-Zahavy and Erez (2002) investigated the influence of framing goals either as a threat or a challenge. Their findings were consistent with goal-setting theory when the goal was framed positively (as a challenge). However, when the goal was framed negatively (as a threat) specific difficult learning goals led to greatest task performance. This study shows that framing of goals should be considered when determining whether learning or outcome goals should be set. This could be used as a way to work with athletes who tend to frame stressors negatively. When reframing is too challenging for an athlete, learning goals should be used to enhance task performance.

Both the goal selection and goal cognition literature outline practical steps that youth athletes may take to increase task performance. A potential offering would guide users to make the most appropriate goal selections based on their situation and individual differences. These selections could help youth athletes to increase their performance, and reduce feelings of a lack of progress through two mechanisms. Firstly, it is hypothesised that athletes would, objectively, improve faster if they made goal selections as suggested in the literature. Secondly, by setting measurable goals, as outlined by goal-setting theory, users could track their progress toward the goal. This

would provide youth athletes with a vivid representation of their progress and should improve subjective feelings of progress.

4.3.3 Directional Maintenance

Once goals are selected then athletes need to work toward goal attainment, there are many theories and procedures athletes could use to further increase task performance. Mindset theory was originally proposed by Gollweitzer (1990), who argues that two different mindsets occur during the process of determining ways in which to achieve goal attainment. First, there is a 'deliberative' mindset where the different ways in which a goal might be attained are considered. Once the method has been decided upon, there is an 'implemental' mindset where it is decided how the chosen method should be applied. Armor and Taylor (2003) investigated the differences between the deliberative and implemental mindsets, finding that participants induced into a deliberative mindset underperformed relative to the participants induced into an implemental mindset. The implementational mindset condition involved removal of choice of game and left the decision to a coin flip, while in the deliberative mindset condition the participants were given a choice between games. No explicit statements regarding mindset or instruction to consider certain aspects of the game were made. The environment was designed to induce the mindsets through a lack or presence of choice.

This study has several things in common with the youth tennis environment. Trainings tend to be highly structured, with coaches making many decisions and athletes performing the various drills and exercises prescribed to them. In matches, however, players are required to make many decisions, for example, choices must be

made right at the start of the match with both players making a decision at the coin toss. In tennis, one player must decide whether to serve or receive, while the other decides which end to play from, meaning both players must make a decision. In youth tennis, the vast majority of matches are played as an individual, and the rules of tennis state that “No coaching is allowed ... Coaching is considered to be communication, advice or instruction of any kind and by any means to a player” (International Tennis Federation, 2019). This match environment may induce some players into a deliberative mindset, and thus impair performance. A well-defined plan for any upcoming decisions, such as those made at the toss, may help induce an implementation mindset for youth tennis players and benefit performance.

This logical extension is essentially the premise of implementation intentions (Gollwitzer, 1999). That is, once a goal intention is formed “I intend to reach x” then this should be translated into implementation intentions “when situation y arises I intend to do z”. Gollwitzer states that if goal intentions are governing behaviour then the processing is conscious and effortful. This is because when goal intentions are used then an individual must always consider potential opportunities to attain goals in any given situation. However, by forming implementation intentions, processing becomes automatic and controlled by situational cues.

Milne, Orbell and Sheeran (1999) investigated the effectiveness of implementation intentions on the goal of regular physical exercise - something that is particularly difficult to initiate (Gollwitzer, 1999). They found that motivational interventions did not influence goal attainment unless it was accompanied by implementation intentions. This research shows that, even with strong motivation, individuals should form implementation intentions in order to attain their goals.

Another technique to increase self-regulated behaviour is 'mental contrasting' - a process visualising the successful completion of a goal, and then contrasting this with a visualisation of a failure at a likely obstacle (e.g., Oettingen, Pak, & Schnetter, 2001). Mental contrasting has been found to increase performance, effort and energy toward goal attainment for high performing participants. For low performance individuals, however, it resulted in lower energy, effort and performance than a positive thinking exercise.

While Oettingen et al. (2001) suggested mental contrasting would also be an adaptive self-regulatory strategy for low performing individuals, because it would help them disengage and find an alternative, more appropriate goal, this is not necessarily the case for all contexts. The present project is focused on helping youth tennis players' development and, particularly in the early stages of development, youth tennis players would be likely to be low performing. It would be preferable, early in development, to extend youth sporting participation. In order to reduce drop-out of less experienced, low-performing individuals, indulging in positive visualisations without contrasting obstacles would be suitable self-regulatory strategy (Oettingen et al., 2001). Therefore, development stage and performance level must be taken into account before determining which strategy to use.

These studies have outlined that both implementation intentions and mental contrasting can be successful self-regulatory strategies. Extending the research, Adriaanse et al. (2010) investigated each strategy individually, and in combination. Mental contrasting and implementation intentions used together (MCII), compared to each strategy on it's own, had the strongest effect for self regulation of snacking habits. The long term effects of regular MCII usage have been seen with participants exercising

approximately twice as much as a control, information-only, group four months after a one-off MCII training session (Stadler, Oettingen, & Gollwitzer, 2009). In a similar study, participants reported eating around 30% more servings of fruits and vegetables than the control, information-only, group two years after receiving MCII training (Stadler, Oettingen, & Gollwitzer, 2010). This type of large, long term, effect is ideally suited to the time-span of youth tennis development.

4.3.4 Directional Change / Goal Termination

Goal termination can happen due to successful attainment of a goal, or a withdrawal of commitment to achieve an unattained goal. This second case can be adaptive if the goal is unattainable or no longer relevant. However, it may also be maladaptive if the goal is attainable and relevant, but the individual chooses to direct attention to less important goals. Wrosch, Scheier, Miller, Schulz and Carver (2003) investigated the association between disengagement of unattainable goals and engagement of other goals with subjective well-being. Among adults with a cancer diagnosis, disengagement of unattainable goals was associated with greater subjective well-being, than adults who remained engaged with unattainable goals. This study reinforces the argument of Oettingen (2001) that low-performing individuals should disregard unsuccessful endeavours and MCII could be used to redirect experienced, but low-performing, youth tennis players toward more fruitful endeavours. In study two this type of adaptive directional change was seen with participants choosing to reduce sporting participation to focus on their university studies.

4.3.5 Self-Regulation Failure

Baumeister et al. (2000) state that an act of self-regulation draws upon a resource, following which an individual will be in a state of 'ego depletion', a state in which the individual is less able to make subsequent self-regulation acts. They go on to argue that this reduction of self-regulation represents an effort to conserve the remaining resource, rather than a state of total deprivation. Muraven and Slessareva (2003) manipulated amount of self-regulation performed and the motivation to perform subsequent self-regulation. They found that in the absence of any motivation individuals performed less self-regulation following previous self-regulation. However, in the presence of motivation, this effect is removed, and hence participants were able to perform self-regulation but *only did so* when sufficiently motivated. This supports the theory presented by Baumeister et al. in terms of existence of ego depletion - it is not a state of complete exhaustion of the resource. This research shows that even after goals are selected and behavioural maintenance is in place, there are still ways that self-regulation can fail due to ego depletion. In order to counter the effects of ego depletion, youth tennis players should focus on the most important goals and behaviours first, in order to reduce the chances of ego depletion occurring at critical moments. Creating a hierarchy of goals can be incorporated into a commercial offering.

Despite taking all appropriate steps there will still be instances where individuals fail to regulate their behaviour. Therefore, it is important to consider the best strategy to deal with these failures to reduce the likelihood of subsequent failure. Adams and Leary (2007) induced participants to fail a self-regulation challenge, and then compared a group receiving a message promoting self-compassion to a control group that did not receive any messaging. The self-compassion group displayed higher

levels of self-regulation following failure than the control group, providing a clear strategy of compassion to self following self-regulation failure. This finding could be used by youth athletes struggling to cope with losses.

4.4 Chapter Summary

This literature review has identified a number of useful strategies that could be incorporated into a product for youth athletes. While this would need to be trialled in the prototyping phase of this project it is useful to gather information on customer reaction to these types of features, this is the basis of the final study of this project. In particular; SDT and ABA could be applied to solve motivational problems for youth athletes; self-regulation literature provides a number of strategies to enhance perceptions of progress as well as discipline and coping with losses.

Chapter 5:

Study Three - Product Development Survey

This short study presented former youth athletes with both mediums for a commercial offering (e.g. mobile phone application, physical book) and collected data on perceptions of each feature. Initially, it was intended that participants would be asked to identify an ideal product or service emerging from this project in order to test preferences for medium and feature set (this was done in studies one and two). However, the data obtained was insufficient to allow this, therefore this study was added to this project. The features were identified by considering the problems experienced by youth athletes (studies one and two, chapters two and three) and then using psychological literature to reduce the problems (literature review, chapter four).

Consistent with the marketing strategy for this project (see section 1.5.4), the benefits of each feature were emphasized, rather than describing the mechanisms. In order to test the reaction to these features, two measures were used; a rating of the appeal, and annual subscription participants would have been willing to pay for each feature. This provides important information on commercial implications of each feature to assist decision-making in the business case (chapter seven).

A potential feature not emerging in the literature review might be to connect youth athletes with qualified sports psychology professionals. The AASP, certified mental performance consultant (CMPC), provides a mechanism to screen potential individuals to partner with. Such a feature could provide multiple benefits to this project. Firstly, it would provide youth athletes with an easy way to connect with sport psychologists after gaining exposure to the benefits of psychological training, a barrier to use identified in study two. Secondly, it might increase support for the product amongst the sport psychology community by providing a pathway for youth athletes to connect with the industry more broadly.

5.1 Methodology

5.1.1 Participants

This study included 203 participants from the first year psychology course at Victoria University of Wellington. Participants competed in both individual sports (31%) and team sports (69%). The majority (74%) of participants had ceased competition, while 26% are still competing in their sport.

Most participants reported their youth sporting participation as spanning five or more years (68%), followed by four years (12%), with a roughly even distribution of participants over shorter durations; three years (7%), two years (7%), and one year (5%). Youth sporting engagement was mostly at a club or school level (54%) followed by regional representative (23%), social (15%) and national representatives (7%).

5.1.2 Materials

An online survey was delivered as part of the research participation programme at Victoria University of Wellington, using Qualtrics software. To maintain consistency, background questions were replicated from study two and used in this study. The product development questions can be found as appendix H.

5.1.3 Procedure

As in Study two, participants were recruited to fulfil part of their requirements for the first year psychology course at Victoria University of Wellington. Responses were screened and removed if participants did not identify a sport (one participant removed) or were found to be multiple responses from the same individual (ten

participants removed). In the instance of multiple responses, the first full questionnaire received was included and any subsequent responses removed.

All data was exported from Qualtrics and analysed in SPSS. Responses supplied under the 'other' category were investigated for potential themes. To assess group differences for continuous variables a repeated-measures ANOVA was conducted and, where a significant difference was found, Tukey post-hoc analysis was used to investigate pairwise comparisons. To test for appeal, each feature was rated using a five-point Likert item ranging from 1 ("not at all appealing") to 5 ("extremely appealing"). A non-parametric Friedman test was conducted to test for significant group differences. Pairwise comparisons were then made using the Wilcoxon signed-rank tests when a significant Friedman result was obtained.

5.2 Results

5.2.1 Product Medium

Participants were asked to provide their preferred medium for a commercial offering. By far, the most popular medium was a mobile phone application (60%) with limited support for each alternative option (see figure 4). The 'other' category for mediums included a theme of in-person (e.g. "Actual person", "Face-to-face", "In-person"). The remaining responses such as "a physical school" and "YouTube videos" are contained in the 'other' category.

Figure 4: Preferred medium for commercial offering

5.2.2 Reaction to Features

All ratings were, on average, positive in that they exceeded the theoretical scale midpoint of 3. To illustrate the responses, mean appeal ratings are presented in figure five, however, to test for significant differences, the data are treated as ordinal. To assess group differences for appeal rating, a Friedman test was conducted and a significant difference between feature appeal was found $\chi^2(4) = 120.22, p < 0.05$. Pairwise comparisons revealed that the communication feature had significantly less appeal than all other features, except access to sport psychologists. Similarly, access to sport psychologists was rated as less appealing than all other features, other than the communication feature. A final significant difference showed that the motivational feature was found to be more appealing than the self-regulation feature.

Figure 5: Mean appeal ratings for each feature (1-5 scale, higher rating represent higher appeal)

Participants were asked to provide the annual subscription they would be willing to pay for access to each feature, means are presented in figure six. To assess group differences for the annual subscription willing to pay, a repeated-measures ANOVA was conducted and a significant result was obtained; $F(4, 724) = 14.05, p < 0.05$. Pairwise comparisons revealed the following significant differences: Annual subscription for access to a sport psychologist was found to be significantly higher than all other features. Significant differences were also found with annual subscription to the communication feature found to be lower than all other groups, except the goal-setting feature. An additional significant difference was found with a lower annual subscription for the goal-setting feature than the self-regulation feature. Lastly, the difference in

annual subscription participants were willing to pay for the goal- setting and motivation features was found to be approaching significance ($p = 0.074$).

Figure 6: Mean annual subscription (NZD) for each feature.

5.3 Discussion

The sample for this study is similar to that of study two, including athletes from team and individual sports as well as athletes still competing and athletes who have ceased competition - a similar mix of participants across experience and playing levels. This provides continuity of samples between studies two and three, as well as, representing a diverse sample appropriate for this project.

The findings of this study have identified a clear medium for a commercial offering: a mobile phone application. This is consistent with study one where most stakeholders (64%) explicitly suggested a mobile phone application as their proposed

market offering. A mobile phone application could be integrated with a website as well as online courses in the future, meeting the preference of more potential users over time. However, as an initial offering, a mobile phone application should be used to create an MVP for this project.

There was strong support for goal-setting, motivation and self-regulation features in the mobile phone application with mean appeal ratings in the range between very and extremely appealing as a willingness for participants to pay an annual subscription in excess of \$80.00 (NZD) for access to each feature. The mechanisms that will be used to design these features have been outlined in the literature review and likely to provide significant benefit to users. These features will form the backbone of the mobile phone application.

Access to sport psychology professionals was rated as less appealing, but had the highest mean annual subscription. This will be investigated further in the business case as providing access to sport psychology professionals presents some legal and ethical responsibilities alongside potential business growth. However, sports psychology content can be integrated into the MVP in other ways.

There was the least support for the communication feature from youth athletes, with it rated as less appealing and had the lowest annual subscription that participants would be willing to pay. However, this was intended to meet the needs of parents and coaches, primarily. It is most important to note that there was still some support for a communication feature amongst athletes which is sufficient to maintain inclusion at this stage.

5.4 Chapter Summary

This study investigated the attitudes of former youth athletes on the proposed product with a survey. Strong support was found for a mobile phone application to help youth athletes with challenges they face. The features that were rated as most appealing features were those related to motivation, goal-setting and self regulation. Participants reported a mean willingness to pay for annual subscriptions in excess of \$80.00 (NZD) for access to each of these features. The findings of this study provide evidence for a commercially viable mobile phone application to help youth athletes with psychological challenges related to their sport.

Chapter 6:
General Discussion

The major finding of the primary research conducted in this project is that the most prevalent problems for youth athletes are psychological in nature. The two most common problems reported were a lack of motivation and a lack of perceived progress. While these problems are addressed in the psychological literature and delivered through sport psychology professionals, there is a lack of knowledge around the application and usefulness of existing commercial offerings in the sport psychology domain. Many youth athletes had no solutions to their problems and these would constitute a viable group to target with a commercial offering.

Secondly, parents and coaches were identified as key stakeholders in the development of youth athletes. A common problem for both parties is communication and relationship management. Current solutions to this problem appear varied and, at times, ineffective. For instance, a coach refused to work with players whose parents were too challenging to deal with, resulting in lost revenue. Similarly, other coaches ignored parents with one coach conceding this led to negative outcomes for the athletes. Providing a means for effective communication between coaches and parents could be used to drive additional support for a commercial product from these key stakeholders.

Through the consultation of the psychological literature, potential features have been identified as holding some benefit to youth athletes. Further testing will be needed to assess suitability for a commercial offering but findings in the literature suggest that many of the problems identified could be solved or reduced. It will also be important to collect data during this testing phase so that the effectiveness can be conveyed to key stakeholders. A performance emphasis will likely be most persuasive to coaches, while focusing on well-being could be used to persuade parents and a combination of both for the youth athletes themselves. Pricing of existing commercial offerings was also found

to be a barrier for some youth athletes, and will need to be carefully considered during the commercialisation phase.

The medium to deliver these strategies and educational interventions to the market was considered through both primary and secondary research. Gould et al. (1999) suggested that worksheets, videos and journals would be superior to traditional books. The findings of studies one and three suggested that a mobile phone application would be preferred by stakeholders in the present market. Worksheets, videos or journals could be incorporated into a mobile phone application to communicate the information rather than large blocks of written text.

There was strong support for features designed to improve motivation, perceived progress and self-regulation. The mean annual subscription that athletes reported a willingness to pay for each feature suggests there would be sufficient demand to create a commercially viable mobile phone application. Further investigation of development costs is outlined in chapter seven to assess the validity of this claim.

Upon entry to the Master of Innovation and Commercialisation programme I was looking to develop a sensor that could be fitted to a tennis racquet. It is through consideration of the work on innovation of Drucker (1985) and Christensen (1997) and lean startup methodology (Ries, 2011) that this project has been developed. The work of these authors moved the project away from the initial proposed product and allowed market validation to drive the development. This has been critical to the identification of a potential product that is better able to solve the problems within the market. In turn, this will be more likely to achieve the objective of this project to support the development of youth tennis players through a commercially viable product.

6.1 Limitations

It is important to note that a significant limitation of these studies is that the data collected is the opinions of participants which may not always align precisely with behaviour (Higham, Reis, & Cohen, 2015). During the next stage in this project, it will be important to gather behavioural data before making any significant financial investment in developing an offering. This will be done by producing a low-cost prototype and distributing this to athletes, parents and coaches in professional networks. This will allow further refinements based on the feedback received which can be implemented in the next iteration at minimal financial cost to the project. Once the content is well-refined, it will then be important to introduce a financial cost to users. If successful, this will provide strong product validation and development of an application could proceed without undue risk.

All participants in the studies conducted in this project are based in New Zealand. While this limitation raises questions around the generalisability of the findings to a global marketplace, there is an accepted business practice of using New Zealand as a test market for global products (Cann, 2016; O'Mahony, 2015). Furthermore, the samples in studies two and three were all university students enrolled in a first year psychology programme at Victoria University of Wellington. This is not necessarily reflective of the entire youth tennis market, but was used for convenience. Lastly, no data was collected on sex and age of participants in studies two and three, as these were not considered critical to the project. However, in retrospect, it would have been helpful to collect this information to provide a greater understanding of the sample. To mitigate these sampling limitations, testing during the prototyping phase will need to ensure a wide demographic of youth tennis players are included.

6.2 Further Applications

The findings from study two indicates that a commercial offering could be extended to other youth sports. This is an important finding and dramatically improves the reach, and commercial viability, of the project. It is also possible that it would also be beneficial to other groups of athletes with limited access to sport psychology professionals (e.g. US Collegiate athletes or adult amateur athletes). These athletes are likely to be experiencing similar challenges and it would be useful to consult with them to test this hypothesis, and also investigate what solutions they may be employing, given they are likely to be more experienced than youth athletes. Furthermore, the findings of this project are also likely to be applicable to non-sporting domains such as education or professional development.

The educational outcomes of secondary schooling would appear to be particularly relevant to this project. The objectives of this project are to help youth tennis players experience success and gain access to the opportunities that entails. There are many parallels with educational challenges and sporting challenges and the insights gained in the development of this project would be well employed in the support of educational success. This potential application would be a satisfying additional outcome to this project.

Chapter 7:
Business Case

7.1 Executive Summary

The aim of this project was to research commercial opportunities within the youth tennis market. I found that the key challenges described by youth tennis players can be characterised as psychological in nature. Specifically, motivation, lack of perceived progress, discipline and dealing with losses were all identified as common problems. Parents and coaches, as key stakeholders, were also consulted and, while there was support for a psychology-based solution, a key problem for both parents and coaches concerned relationship management with each other. I next consulted literature within the field of sport psychology and identified a number of strategies that could be incorporated into a product to help youth tennis players with these psychological challenges. Further research was conducted with athletes with experience of participation of a range of team and individual sports. The findings showed that psychological challenges are significant for youth athletes from *all* sports. A path to commercialisation for a mobile phone application, *Coleman*, is outlined and recommendations are made for future work in this project.

7.2 Introduction

The business case is a stand-alone document and, therefore, the information from earlier chapters within this report will be summarised here. Also, it is designed for a business audience and, as such, language and tone will be consistent with business writing conventions. O'Hara (2014) and Khan (2019) argue that business writing needs to be clear, concise and avoid unnecessary jargon or academic language. O'Hara (2014) also recommends that business writing present the main idea at the start of the document to convey the salient information to the reader up-front. Therefore, the proposed product will be presented at the start of this chapter to give readers context and an understanding of where the project is leading. Although this document will be used to promote the opportunities associated with the proposed product, it is intended to present information in a straightforward and factual manner avoiding hyperbole, consistent with Khan (2019).

The proposed product, background and vision are outlined before presenting the findings of the research conducted as part of this project. Interviews and surveys were conducted with key stakeholders, and academic literature was consulted for potential solutions to the problems identified during the research. Commercial implications of these findings and insights are discussed in relation to developing a commercially viable mobile phone application. An environmental analysis presents important considerations for this project and a development plan presents both a timeline and financial projection for taking this project through a prototyping phase to completed production of an MVP.

7.2.1 *The Proposed Product - Coleman*

The proposed product derived from this project is a mobile phone application, codenamed *Coleman* (in reference to Coleman Griffith who worked as an applied sport psychologist with the Chicago Cubs in 1938 and is regarded as “the father of sport psychology”; Kroll & Lewis, 1970). Empirically-tested findings from psychological research will be applied to guide youth athletes along their journey to success. Users will be able to set customised goals in ways that will help them maximise their performance on the court. Once goals are set, *Coleman* will provide strategies to help users stay on track towards achieving their goals. It is envisaged that future developments will take the insights gained while creating *Coleman* and apply them to an educational context.

7.2.2 *Background*

I gained a Bachelor of Science majoring in physics and psychology before going on to achieve a first class honours degree in psychology, all at Victoria University of Wellington. After my university studies, I followed a passion and formed a tennis academy in partnership, and later, operating on my own. I focus on working with high-performing adolescent athletes and have successfully guided players from beginners to US College scholarships. In recognition of my work I was awarded Tennis New Zealand Performance Coach of the Year in 2018.

Throughout my time coaching, I have witnessed the powerful benefits that sporting excellence can have on adolescents. Along the way, there are many difficult times and, from my observation, unnecessary anguish for players. This project was born

out of my desire to help simplify and accelerate the athletic development of youth tennis players so that more people can enjoy the benefits of sporting success.

7.2.3 Goals and Vision

The goals of this project are to assist youth tennis players with their athletic development. A commercially viable product that achieves this goal will the benefits obtained from utilisation of psychological literature to be widely enjoyed by youth tennis players. The vision for this product is to create a mobile phone application that is considered to be a vital part of training by coaches of youth athletes around the world.

7.2.4 Project Development

This project followed the principles of lean methodology using an iterative process of learning (figure 1 repeated from p.15) to shape the direction taken (Ries, 2011) . Innovation was considered in light of the insights of Drucker (1985) and Christensen (1997) and sought to bring new knowledge and, therefore, a unique value proposition to the youth tennis player market. Value was considered as something which provides a benefit to the customer (Ries, 2011). Throughout the development of this project a lean startup methodology has been used as a reference-point and any other business models (such as business development models, marketing models) have been considered in light of lean startup methodology (Ries, 2011). A consistent and integrated approach was sought wherever possible.

Figure 2: Lean startup methodology innovation cycle (Ries, 2011)

7.2.5 Target Market

The market this project is defined as existing youth tennis players aged under 18 years and participating in tennis ten or more times annually. This group of tennis players have been found to play tennis an average of 42 times annually and spend around \$650.00 (NZD) per player (Tennis Industry Association, 2015). In the United States of America, there were 2.68 million people who fit these criteria (Tennis Industry Association, 2017) which was determined to be a sufficient market size while also maintaining a clear market segment to target (as argued by Drucker, 1985).

While the intention is for *Coleman* to serve the global youth tennis market, New Zealand will be used as test market. This is consistent with the other technology-based companies using New Zealand to test new features or products (Cann, 2016; O'Mahony, 2015). There are approximately 16,000 junior club members in New Zealand (Tennis

New Zealand, 2017), which will help the business identify the best customer profiles to target. Demographics such as age-groups, level of play or experience will be collected to inform business decisions prior to expansion into other markets (see p. 21-23 for a full justification of market identification).

7.3 Market Validation

I shall briefly outline research conducted into market problems, existing solutions, and interviews conducted with coaches, parents and athletes involved in the youth tennis market (see chapter two for full details). The findings from the interviews were then used to create a survey that was conducted with former youth athletes from a range of sports, to generalize the interview findings across both individual and team sports (see chapter three for full details). With a clear understanding of the market problems, the psychological literature was then consulted for ways to help solve the problems experienced by youth athletes (see chapter four for full details).

7.3.1 Market Problems and Existing Solutions

During market validation, interviews and surveys were used to explore problems and the existing solutions for youth athletes. The first market validation study consisted of exploratory interviews with former youth athletes, parents and coaches all involved in the youth tennis market. Former, rather than current, youth athletes were interviewed so that they could provide an overview of their most prominent problems experienced during their youth career. Parents and coaches were included as key stakeholders (their inclusion as stakeholders was later validated in the findings of study one, p. 41). A total of 13 in-depth interviews were conducted in this study, providing a

broad overview of the market problems and existing solutions. Table nine presents the problems identified in study one for each stakeholder group.

Table 9 <i>Stakeholder problems in youth tennis market</i>	
Stakeholder	Problems
Athletes	Maintaining motivation
	Feeling like they aren't progressing
	Discipline
	Coping with losses
Parents	Relationship management with coaches
	Unable to help children struggling with psychological aspects of sport
Coaches	Relationship management with parents
	Communication with athletes
	Motivation of athletes

These interviews suggested that the problems experienced by youth tennis players may extend to other youth sports. Therefore, study two included 269 current and former youth athletes from a wide range of sports (see appendix C for the full list). The results of study two supported the hypothesis that the problems identified in study one would be present in youth athletes from sports other than tennis. It was found that around 93% of youth athletes identified a psychological challenges as their most significant problem. There was no statistically significant differences found for solution

effectiveness (measured on a 5-point Likert scale item) between the problems. Table ten presents the prevalence of problems experienced by youth athletes.

Table 10 <i>Prevalence of problems experienced by youth athletes</i>	
Most significant problem	Frequency (%)
Maintaining motivation	33%
Lack of perceived progress	31%
Coping with losses	14%
Maintaining discipline	9%
Other psychological problem	7%
Non-psychological problem	7%

Study two also investigated existing solutions and the effectiveness of each solution (table 11). The only statistically significant difference was found to be between the 'no solution' group and all other solution groups. This suggests that by employing *any* solution, youth athletes perceive their problems to be closer to solution than by not employing any solution at all.

Table 11

Existing solutions for psychological challenges

Solution	Frequency (%)	Effectiveness rank
None	37%	7*
Increase Training	19%	4
Social Motivation	12%	5
Maintain Training	11%	2
Goal-Setting	9%	3
Positive Mindset	5%	1
Other	7%	6
*‘No solution’ was found to be statistically significantly less effective than any of the other solutions at a $p < 0.05$ significance level.		

7.3.2 Sport Psychology

The field of sport psychology applies psychological literature and findings to improve both the well-being and performance of athletes (American Psychological Association, 2003). Therefore, sports psychology should be able to provide guidance towards solutions to all of the problems identified in this project. This makes for an interesting opportunity, where the resources are available to address the market problems, but are not being utilised. Therefore, as part of this project, I investigated the barrier to using sports psychology products and services. There were three prevalent barriers to use current sport psychology products and services;

- Lack of knowledge

- Lack of perceived efficacy
- Price

With market problems and barriers to use clearly identified, I investigated psychological theory and research pertinent to these problems and barriers.

Furthermore, potential solutions to the problems were also identified in the literature review (for full details see chapter five). Table 12 presents the potential solutions derived from the literature review and the primary problem that each is intended to address. It is worth noting that many features would be likely to help multiple challenges faced by the youth athletes (for example mental contrasting has been found to increase energisation toward goal-directed behaviour, which is likely to increase motivation).

Table 12 <i>Application of psychology literature to problems identified</i>		
Evidence-based feature	Theory or strategy	Primary problem addressed
Educational component for players, parents and coaches	<ul style="list-style-type: none"> • ABA • SDT 	Maintaining motivation
Motivational features	<ul style="list-style-type: none"> • SDT 	Maintaining motivation
Goal-setting and tracking	<ul style="list-style-type: none"> • Goal-setting theory • Drach-Zahavy and Erez (2002) research paper • Mindset theory 	Lack of perceived progress
Self-regulation features	<ul style="list-style-type: none"> • Implementation intentions • Mental contrasting • Self-compassion 	Discipline
		Coping with losses

7.3.3 Product Medium

Study three included 203 current and former athletes and identified a strong preference for a mobile phone application. It was found that 60% preferred a mobile phone application with the next most popular choices a website (12%) and then an online course (11%). While development of websites and online courses could be completed as part of this project in future, the first product will consist of a stand-alone mobile phone application.

7.3.4 PEST Analysis

To gain an understanding of environmental trends that are likely to influence the success of *Coleman* a 'PEST' analysis (Post, 2018) was conducted. PEST analysis is an acronym representing; Political, Economic, Social, Technology (Law, 2011).

Political: Sport New Zealand is a crown agency responsible for governing sport and recreation in New Zealand (Ministry for Culture & Heritage, 2019). One of the goals stated in *Young People Plan 2015-20* (Sport New Zealand, 2015) is to increase youth sporting participation. In order to achieve this goal, Sport New Zealand has identified increasing physical literacy in youth as an important factor. Physical literacy incorporates motivation, confidence and competence to be physically active (Ellerton, 2018). Therefore, the objectives of *Coleman* align well with current political trends and may even be a resource that Sport New Zealand would be interested in using as part of their *Young People Plan 2015-20*.

Economic: Sedláček and Sterk (2017) found that the stage of the economic cycle during launch influences the chances of success for startup businesses. Specifically, launching during a recession reduces the chances of survival for a startup business.

Therefore, it is important to identify the current phase of the economic cycle. The 'Warren Buffet indicator', which compares the total market value to gross domestic product in the United States of America, is considered to be a key valuation metric (Strašek, 2017). Values in excess of 100% indicate overvaluation in the market and suggest a recession is likely to occur in the near future (Strašek, 2017). At 31 March 2019, the Warren Buffet indicator was 141%, indicating a significantly overvalued market. Another predictor of recession is an "inverted yield curve", which is when short term interest rates become higher than long term interest rates. An inverted yield curve predicted recessions in 1981, 1991, 2000 and 2007 (Anand & Singh, 2011). At 31 March 2019, the 10-year interest rate was 0.01% higher than the 1-year interest rate for US treasury bonds. This represents an *almost* flat yield curve that is trending toward inversion. This impending recession represents a risk to launching *Coleman* in the near future.

Social: There is a trend of reduced sporting participation between the ages of six and twelve years, with a drop of around 8% over the last decade (Bogage, 2017). This age-group represents the future potential users for *Coleman* and, if it continues, presents a challenge to the business. Future iterations may require the business to pivot and focus on producing a higher-value offering to a smaller market, which would help reduce the impact of a shrinking customer base. Another social trend that is important to this project is mobile phone usage. Research New Zealand (2015) found that smartphone usage is trending upward with 48% of smartphone users reporting an increase in use from 2014 to 2015. This trend is potentially linked to reduced youth sporting participation, so it represents both positives and negatives for *Coleman*. On the positive side, it supports the choice of a mobile phone application as a product medium.

However, if smartphone usage continues to trend upward then this may impact negatively on the potential customer base as this time spent on smartphones may be at the expense of sporting participation.

Technological: The mobile phone application industry was created in 2008 and has now grown to millions of developers and billions of smartphone users (Dogtiev, 2019). This allows the potential for *Coleman* to reach a huge market of potential users through the application stores. There are two main application stores, those of Google (60% of total downloads in 2017) and Apple (17% of total downloads in 2017; App Annie, 2017). Therefore, *Coleman* will be launched on the “Google Play” application store as an MVP and the following analysis will focus exclusively on the “Google Play” application store.

7.3.5 Competitor Analysis

In order to understand the current market offerings that *Coleman* would compete with, a search for competitors was undertaken. Table 13 presented the keyword searches used to identify potential competitors. Searches included all possible combinations with one cell from each column. No mobile phone applications were found that were specifically targeted to sport psychology for youth athletes.

Table 13

Keyword search for competitors in Apple App Store and Google Play store

Youth	Sport	Psychology
Child	Sports	Mental skills
Children	Sporting	Goal-setting
Adolescent	Athlete	Self-regulation
Teenage	Athletes	Motivation
Junior	Tennis	Discipline
		Coping

While no directly competing mobile phone applications were identified, there were a number of generic apps that perform some of the functions identified to be incorporated into *Coleman*. Table 14 presents the mobile phone applications in the “Google Play” application store that were retrieved with the search terms “sport psychology”, “goal setting” and “youth sport”. To identify the most successful applications the results were filtered to include those with more than ten million estimated downloads. To estimate downloads the number of reviews were multiplied by 1000, argued to be an expedient ‘rule of thumb’ by Harney (2016).

The two most downloaded applications offer general psychological training aimed at increasing functioning (*NeuroNation*) or well-being (*Fabulous*). This is a positive indicator for *Coleman*, with the goal to increase both performance and well-being, these appear to be popular uses for mobile phone applications. While all applications identified in this analysis are highly rated, the highest rating is for *Sworkit Kids*, an application targeted to children. Again, this is encouraging for *Coleman*, with

this the same target market, the higher rating suggest users find this application particularly beneficial.

Table 14

Competitor Analysis

Application	Estimated downloads	Rating	Description
NeuroNation - Brain Training and Brain Games	265 million	4.5	Brain training and memory games designed to improve memory and concentration, and reduce stress and risk of dementia. High quality design.
Fabulous: Self Care	236 million	4.6	Allows users to build and track daily routines. Incorporates workouts, meditation, and tools to increase focus. High quality design.
Habit Tracker	61 million	4.5	Users can track good and bad habits in order to improve their routines. It is designed to work across multiple platforms and has a high quality design.
Goal Tracker and Habit List and Workout Calendar	18 million	4.6	A simplistic app where users mark a calendar to signify success in completing a daily behaviour. Low quality design.
Goal Meter: Goal Tracker, Habit Changer, and Exceeding	13 million	4.6	Users can track habits, set goals and create to-do lists. There are a range of categories users can select. A unique and appealing design.
Sworkit Kids - Fitness Meets Fun	11 million	4.7	Designed to make fitness fun and engaging for children aged 7-14 years. Users can choose from a variety of workouts or they can design their own.

7.3.6 SWOT Analysis

To identify both internal and external factors that will be important to the success of *Coleman*, a SWOT analysis was conducted (Berry, 2013). SWOT is an acronym for Strengths, Weaknesses, Opportunities, Threats and, contrary to PEST analysis, takes an external viewpoint (Law, 2011). Post (2018) argues that in order to conduct a more complete strategic business plan it is best to conduct both PEST and SWOT analyses.

Table 15 <i>SWOT analysis for Coleman</i>	
Strengths	Weaknesses
<ul style="list-style-type: none"> • Well-defined market segment • Based on empirical findings • Solves problems for multiple stakeholders 	<ul style="list-style-type: none"> • New to market and therefore no brand awareness • Only available on mobile phone platforms
Opportunities	Threats
<ul style="list-style-type: none"> • Time spent on mobile phone applications in increasing • Potential support from Sport New Zealand 	<ul style="list-style-type: none"> • Youth sports participation is declining • Limited intellectual property protection • Current stage of economic cycle

7.3.7 Marketing Strategy

The “4 P’s” model of product, price, place, promotion has been a cornerstone of modern marketing for decades (Goldsmith, 1999) and is used in this project with elements of the SAVE (Solution, Access, Value, Education) model (Ettenson, Conrado & Knowles, 2012) integrated. This was done to better align with the lean startup methodology used in this project (see p. 29 for more details).

Product: The marketing will emphasize benefits to each stakeholder. To youth athletes, the emphasis will be on improved well-being and athletic performance. Messaging to parents will focus on improving their relationship with their child's coach as well as enhancing the well-being of their child. Coaches will also receive messages relating to improving their relationships with parents along with performance benefits for their students.

Price: An annual subscription model will be used (rather than monthly subscriptions, for example) as this provides a more stable income and enhances customer retention (Chargify, 2016). Table 16 presents the mean and standard deviation for the annual subscription participants were willing to pay for access to each feature. The means are in the range of \$75.00 - \$110.00 with the standard deviations greater than the mean in all cases, indicating that the distribution is skewed toward the bottom and there is a large amount of spread in the data. This means that there is a wide range of annual subscriptions that participants would be willing to pay, lower and upper quartiles are provided to illustrate the range of the data. In order to price *Coleman* appropriately, it was decided that the communication platform work be provided free to users. This is intended to drive users to the application through coach and parent support by assisting with relationship management, thus solving a problem for parents and coaches. Access to sport psychology features will be offered for \$79.00 following a trial period. This price was determined by approximating the annual subscription participants would be willing to pay for one feature. This is intended to ensure that if any, one, feature is appealing, pricing is low enough to lead to a purchase of a subscription to *Coleman*. Furthermore, a conservative pricing approach was taken as price was identified as a barrier to use for sport psychology products and services.

Table 16

Annual subscription participants were willing to pay for access to individual features

Feature	Mean (NZD)	SD	Lower Quartile	Upper Quartile
Access to sport psychology professional	\$109.28	\$109.43	\$30.00	\$150.00
Increase discipline	\$93.76	\$100.42	\$25.00	\$129.50
Increase motivation	\$87.34	\$94.56	\$25.00	\$111.50
Goal-setting & tracking	\$80.95	\$102.20	\$20.00	\$100.00
Communication platform for players, parents and coaches	\$75.12	\$92.35	\$19.00	\$100.00

Place: As discussed in the technological component of the PEST analysis (p. 115)

Coleman will initially be sold through the “Google Play” application store. Subsequent developments may extend placement to the Apple-owed “App Store” in order to reach iPhone users.

Promotion: As both a lack of knowledge and lack of perceived efficacy were identified as barriers to use, promotion will play a critical role in the success of *Coleman*. Stakeholders will need to be informed on the function of sport psychology and the efficacy, messaging can be tested in the prototyping phase. Furthermore, with coaches identified as key influencers in the sport psychology market for youth athletes, much of the promotion will focus on coaches. Promotional activities will include direct communication, online campaigns (e.g. Google Play store, Google Adwords, Facebook), presentations and workshops. It is intended that coaches will then enlist their athletes to *Coleman* with the free communication platform. This will provide greater market penetration because coaches work with multiple players at any given time. Once using

Problem; the major problems and the existing solutions currently employed (p. 108-111). The two most prevalent problems were maintaining motivation (33%) and a lack of perceived progress (31%) with less frequent problems found to be coping with losses (14%) and maintaining discipline (9%). Common existing solutions were nothing (37%), increase training (19%), social motivation (12%), maintain training (11%) and goal-setting (9%).

Solution; the proposed solutions for each problem. Psychological literature was consulted to identify solutions, table 12 (p. 112) summarises the solutions found.

Key Metrics; the key numbers that indicate business success. Two metrics that will be vital to understand customer reaction will be number of subscriptions and review rating on the “Google Play” application store.

Unique Value Proposition; a single, clear message outlining a compelling difference and the high-level concept (and ‘x for y’ analogy). *Coleman* will help youth tennis players to increase their performance and well-being in relation to tennis. The high level concept of *Coleman* is a sport psychology hub for athletes, coaches and parents.

Unfair Advantage; something that is difficult to buy or copy. This will be a challenge for *Coleman* because it is based on publicly available information. However, I have the advantage of first-to-market, which will allow time to build brand awareness, potentially creating an unfair advantage.

Channels; the paths to customers. The channel for the MVP of *Coleman* will be the “Google Play” application store (p. 115).

Customer Segments; target customers and the characteristics of an ideal customer. The customer segment that *Coleman* will initially focus on is youth tennis

players in New Zealand that play ten or more times per year (p. 107-108). An ideal customer within this segment would be an Android user struggling with a psychological problem *Coleman* is targeted to address and does not have an existing solution.

Cost structure; the fixed and variable costs. The estimated development cost was found to be \$80,000.00 (NZD; p. 126-127) and represents the major fixed cost as no owner's salary will be taken in the initial stages of the business. Maintenance costs are estimated to be \$10,000 while customer acquisition costs (marketing and promotional activities) are yet to be determined.

Revenue Streams; the sources of revenue. The main source of revenue will be subscriptions, however, there is also the potential to gain advertising revenue by placing advertisements on the application. To reduce annoyance, advertising would not be present for subscribers and free users could pay to have it removed.

7.5 Product Validation

In order to test the commercial possibilities of the proposed product for this project, former youth athletes were first surveyed on their preferences for each proposed feature. They were asked to rate the appeal and also the annual subscription they would be willing to pay for each feature (in NZD). Following the results of this study, a development plan along with a financial analysis and an intellectual property protection plan were created.

7.5.1 Product Features

As part of a third market study, former youth athletes were asked to rate appeal and the annual subscription they would be willing to pay for each feature identified in

previous research. Table 17 presents the ranking for appeal and the mean annual subscription participants were willing to pay. The communication platform will be provided free of charge and is, primarily, focused on meeting the needs of parents and coaches. The most appealing features relate to motivation, goal-setting and discipline, these features also have a mean annual subscription over \$80.00, both findings providing good support for these features. The highest annual subscription is for access to sport psychology professionals, however, this feature was rated as less appealing than the previously mentioned features. Furthermore, this feature represents an ongoing cost as well as scaling, ethical and legal challenges. For example, if *Coleman* were to provide a means for users to connect with sport psychologists, there is a challenge of quality control, especially when attempting to scale up. Also, sports psychology is effectively unregulated in New Zealand as there is no 'scope of practice' under which a person can register as a sports psychologist with the NZ Psychologists Registration Board, and this means that it is illegal for someone to refer to themselves in this way. This has ethical and, potentially, legal implications for *Coleman*. Therefore, it has been decided to exclude this feature from the MVP of *Coleman* until these risks can be fully explored and mitigated. All other features presented in table 17 will be included in the initial development of *Coleman*.

Table 17 <i>Reaction to features</i>		
Feature	Appeal Ranking	Mean annual subscription
Increase motivation	1	\$87.34
Goal-setting & tracking	2	\$80.95
Increase discipline	3	\$93.76
Access to sport psychology professional	4	\$109.28
Communication platform for players, parents and coaches	5	\$75.12

7.5.2 Product Prototyping

To further validate the findings to date, a low-cost online prototype will be developed and tested. The prototype will be developed using the “WordPress” platform which offers a wide range of “plugin” features that I will be able to use to build a prototype at very little cost. All of the research conducted has collected has been attitudinal and this does not always align with behaviour (Higham et al., 2015). Therefore, it will be important to collect behavioural data in the prototyping phase (e.g. product use, training hours, competitive results). Once a prototype is refined to meet the needs of the athletes, a cost will be introduced. This will provide behavioural evidence that youth athletes will be willing to pay for *Coleman*. This prototyping phase will allow for refinement of features as well as providing behavioural evidence of willingness to pay, and thus, reduce risk.

7.6 Requirements and Returns

7.6.1 *The Skills Required*

During the initial stage of the business, many of the functions will be outsourced in order to reduce overhead costs. This will allow development to be conducted in a financially sustainable manner, without the need to ongoing salary payments. Outsourced functions will include; application development, application design, marketing, legal counsel, accounting and financial functions. Ideally, recruitment of a qualified sport psychology professional will be made during the prototyping phase, this will add both knowledge and credibility to Coleman team.

7.6.2 *Intellectual Property*

The work that *Coleman* is based upon is part of the public domain, primarily through journal articles, therefore, competitors could also access this information. It will be important to protect intellectual property created during the development of *Coleman*, this will provide some protection from competitors. Yang (2018) outlines the four types of intellectual property protection available; trade secrets, trademarks, copyrights and patents. Trade secrets are used to protect secret information (such as a recipe), it relatively inexpensive to implement, and requires no registration, just that the owner has taken reasonable steps to protect the information from becoming public. Trademarks are used to protect branding (such as “Nike”), has optional registration and is relatively inexpensive to implement. Copyrights are used to protect authorship of material (such as music), has optional registration and is relatively inexpensive to implement. Patents are used to protect either functional (such as swipe function on an iPhone) or ornamental (such as the shape of a Coke bottle) features of inventions,

require registration and are expensive to implement (Yang, 2018). The code used to develop the application will be protected through copyright laws. Branding will form a part of any potential commercial advantage and this will be protected through trademarks. Any underlying algorithms created during the development of *Coleman* will be protected by trade secrets.

7.6.3 Product Development Costs

The development cost for a *Coleman* is not currently possible to calculate precisely because features will be determined in the prototyping phase. However, an approximate cost has been determined to be \$80,000 (all figures are converted to NZD). Panko (2017) surveyed around 100 mobile phone application development firms to assess development costs. The majority of projects (70%) require a discovery phase, costing up to \$7500. This project, to date, forms this discovery phase so this will not be an expense during mobile phone application development. The median design phase cost was between \$15,000 and \$22,500. Panko (2017) states that estimating costs for a feature-set is the most challenging aspect of budgeting development costs but by looking at the data obtained in Panko (2017) it appears the type of feature-set required for *Coleman* would be approximately \$40,000. Further costs were testing and deployment (\$7,500 - \$15,000), giving an approximate total mean development cost of \$62,500 - \$85,000.

To further support this estimate, Chew (2019) suggested development costs to replicate an MVP of well-known applications; Whatsapp, Instagram or Uber would take a total of 650 - 1000 hours to develop. Rates for 3-6 month contracts for mobile phone application (Appendix I from seek.co.nz) developers are up to \$95.00 per hour. This

produces a range of \$61,750 - \$95,000. Given the complexity and quality of these applications, it is considered the approximate midpoint of \$80,000 is an appropriate estimate for *Coleman* development costs. Ongoing maintenance costs are estimated to be \$10,000 with mean annual maintenance cost found to be \$7,500 - \$15,000 (Panko, 2017).

7.6.4 Development Timeline

The development schedule will depend on the number of iterations required for the prototyping phase. Each prototype cycle will run for one school term, aligning with tennis academy schedules, and the school holidays will be used to analyse data and refine the prototype. This will give a full prototype cycle of approximately three months. At a minimum, two cycles will be needed, one to test the behavioural outcomes of the prototype and another to test if youth tennis players are willing to pay for access to the prototype. At most, it is estimated that four cycles will be needed to refine the prototype. Therefore, the prototyping phase is scheduled to run for six months to one year. The application development is expected to take up to six months, based on the research presented outlining the development costs (p. 126 - 127).

7.6.5 Funding and Returns

The current intention is for this project to be funded through my personal funds. This will allow me the freedom to continue to develop *Coleman* without the need to satisfy investors. It may be possible to obtain a grant and/or advice and mentorship through Callaghan Innovation, a crown entity which may be interested in *Coleman* as their role is to “activate innovation and help businesses grow faster” (Callaghan

Innovation, 2019). An approach to Callaghan Innovation will be made during the prototyping phase.

The scope of this project does not include estimation of potential financial returns. This is because it is unlikely to produce any meaningful information, as Christensen (1997, p. 158) states, “It is simply impossible to predict with any useful degree of precision how disruptive products will be used or how large their market will be”. Therefore, this project has been working to identify market problems and develop a commercial offering that is able to solve these problems. Success in achieving those two goals will result in a financially viable product, however, it is unclear how significant the returns would be.

While it was determined inconsequential to speculate on the success of a disruptive innovation, to understand the risks involved I will consider the minimum requirements to break even on costs. At the end of the first year, *Coleman* will need to attract approximately 1140 subscribers in order breakeven on the development and maintenance at the pricing and costing level identified here. In the New Zealand market, there are 16,000 youth tennis players and the Android (the operating system associated with the Google Play application store) market share is 54% (StatCounter, 2019) resulting in a market of 8,640. The problems *Coleman* is focusing on solving were experienced by 87% of youth athletes and by examining the lower quartile of the annual subscriptions youth athletes were willing to pay it can be estimated that 25% of the market would not be willing to pay the price set (the sum of the lower quartiles for features that will be developed is \$89.00, approximately the price that has been set). This results in a potential market of approximately 5,640 youth tennis players in New Zealand who are likely to be experiencing the problems *Coleman* will help solve and

willing to pay the annual subscription set here. Of those players, 37% of youth athletes had no existing solution, leading to a statistically significant reduction in perceived solution effectiveness. These 2090 youth tennis players represent the ideal customer profile. Therefore, *Coleman* would need to attract 55% of youth tennis players in New Zealand who represent ideal customers, this appears to be a reasonably safe proposition, especially given my professional networks within the New Zealand market. Further reinforcing the potential of *Coleman* there is also the possibility to expand into other geographical markets, for instance, employing the same analysis on the USA youth tennis player market yields approximately 350,000 youth tennis players who fit the ideal customer profile. In addition to other geographical markets, there is also the opportunity to gain advertising revenue as well as expanding to other sports, non-sporting domains, or alternative business models (such as working with Sport New Zealand).

7.7 Chapter Summary

This chapter presented a business case for a mobile phone application, *Coleman*. Working within a lean startup methodology (Ries, 2011) framework, this chapter started by summarising the market research conducted and the pertinent findings. The psychological literature review was then outlined with relevant theories, mechanisms and strategies identified. An environmental analysis, marketing strategy and financial projection were used to create a business model on the lean canvas (Maurya, 2012). Lastly, funding and returns were considered with an emphasis on identifying the level of financial risk present in the development of *Coleman*.

Chapter 8:

Conclusion

This project set out to identify a commercially viable product or service that will enhance the development of youth tennis players. Consistent with Ries (2011), the first step taken to achieve this goal was to identify the problems experienced in the youth tennis market. Empirical research conducted in this project has identified psychological challenges as a prevalent problem in *both* youth tennis players and youth athletes generally. Therefore, the value *Coleman* brings to the market is reducing psychological challenges for youth tennis players through insights derived from well-supported findings in psychological literature. Furthermore, *Coleman* will address another market problem of relationship management for key stakeholders, coaches and parents. The business case sets out a commercialisation plan, including financial analysis, and *Coleman* appears, not only, to be financially viable but appears to have the potential to be financially successful.

With *Coleman* meeting the goals of this project and, through competitor analysis, appears to represent a genuinely innovative product, this project will continue to be pursued. The prototyping phase has been outlined above and this will provide critical feedback that will continue to shape the development of *Coleman*, following lean startup methodology of Ries (2011). Further engagement of the startup community in Wellington will provide additional support and assistance through the development phase. Lastly, it is the ultimate goal of providing assistance to a wide group of youth tennis players (and potentially youth athletes in general) is achievable through *Coleman*.

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Appendix A

Athlete Interview Schedule: Study One

The approximate interview time was 30-60 minutes.

Background:

1. What experience have you had in sport and what roles have you had?

Development Process:

1. In your opinion, ideally, who are the parties involved and what are their responsibilities?
2. In your role, what is the most challenging part of the development process?
3. What have you done to combat this problem?

Motivation:

1. Why did you first start playing your sport?
2. What motivated you to play/train more initially?
3. After your training increased what motivated you to continue to train at a high intensity?
4. What are the hardest aspects of training at a high level?
5. If no longer competing, at what age did you stop and why?

Technology:

1. What technology have you used in relation to your sport?
2. Why do you use it?
3. What do you like about this technology?
4. What don't you like about this technology?

General:

1. If this were your project, what would you do?

Appendix B

Parent and Coach Interview Schedule: Study One

The approximate interview time was 30-60 minutes.

Background:

1. What experience have you had in sport and what roles have you had?

Development Process:

1. In your opinion, ideally, who are the parties involved and what are their responsibilities?
2. In your role, what is the most challenging part of the development process?
3. What have you done to combat this problem?

Motivation:

1. What do you do in your role to motivate athletes?
2. What works well with this?
3. What doesn't work well?

Technology:

1. What technology have you used in relation to your sport?
2. Why do you use it?
3. What do you like about this technology?
4. What don't you like about this technology?

General:

1. If this were your project, what would you do?

Appendix C

Primary Sport for Participants in Study Two.

Sport	n
Netball	71
Football (soccer)	48
Hockey	25
Rugby	18
Tennis	15
Dance	11
Swimming	10
Basketball	8
Rowing	7
Badminton	7
Gymnastics	5
Volleyball	5
Waterpolo	5
Cheerleading	3
Equestrian	3
Running	3
Table Tennis	3
Archery	2
Boxing	2
Kickboxing	2
Touch rugby	2
Crossfit	1
Cycling	1
Fencing	1

Lacrosse	1
Lawn Bowls	1
Martial arts	1
Orienteering	1
Roller Skating	1
Sailing	1
Surfing	1
Skiing	1
Underwater Hockey	1
Waka Ama	1
Weightlifting	1

Appendix D

Athlete Questionnaire: Study Two

Block 1

Innovation in Tennis Development

INFORMATION FOR SURVEY PARTICIPANTS

Thank you for your interest in this project. Please read this information before deciding whether or not to take part. If you decide to participate, thank you. If you decide not to take part, thank you for considering my request.

Who am I?

My name is Jacob Emery and I am a Masters student in the Innovation and Commercialisation programme at Victoria University of Wellington. This research project is work towards my thesis.

What is the aim of the project?

The first phase of this project is looking at ways in which new technologies can be applied to innovations in tennis to assist players in developing their game. Following this, potential solutions will be explored and best paths to market identified to investigate the commercial viability of the proposed solution.

This research has been approved by the Victoria University of Wellington Human Ethics Committee: approval number 25034.

How can you help?

If you agree to take part you will complete a survey. The survey will ask you questions about your experiences in sport. The survey will take you 15 minutes to complete.

What will happen to the information you give?

This research is anonymous. This means that nobody, including the researchers will be aware of your identity. By answering it, you are giving consent for us to use your responses in this research. Your answers will remain completely anonymous and unidentifiable. Once you submit the survey, it will be impossible to retract your answer. Please do not include any personal identifiable information in your responses.

Personal details will be collected only for those who request a copy of the final report. All personal details will be received separately from the survey data. This ensures that your answers to the survey questions are anonymous.

What will the project produce?

The information from my research will be used in my Master's thesis and/or a report to academic publications and conferences.

Block 7

So that we can give you credit for completing this research, please enter your 9 digit student ID number.

This will be separated from your responses to the other questions in the survey

Block 6

What was the main sport you participated in during your adolescence?

Do you still actively compete in this sport?

*This question is required because it determines which questions you are asked later in the survey

☐ Yes

☐ No

Why have you ceased competition? Please state main reason

Block 3

How long did you participate?

- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☐ 4 years
- ☐ 5 years or more

What level did you reach?

- ☐ Social (never competed)
- ☐ Club or School representative
- ☐ Regional representative (e.g. Wellington rep team)
- ☐ National representative (e.g. New Zealand team)

What was the main reason(s) you competed for as long as you did? Select up to three

- ☐ Friends / Social reasons
- ☐ Liked the challenge
- ☐ Enjoyed improving
- ☐ Because I was successful
- ☐ Parents wanted me to
- ☐ Other (please state)

Block 2

What was the biggest challenge you have faced during your involvement?

- ☐ Maintaining motivation
- ☐ Maintaining discipline
- ☐ Dealing with losses
- ☐ Feeling like you aren't progressing
- ☐ Other (please state)

Did you take any actions to reduce the negative impact of this challenge?

How effective were your actions in dealing with this challenge?

- ☐ Extremely effective
- ☐ Very effective
- ☐ Moderately effective
- ☐ Slightly effective
- ☐ Not effective at all

Did anyone help you with setting goals for your sport?

- ☐ Yes (please state their role)
- ☐ No
- ☐ Didn't set any goals

Have you ever worked with a sports psychologist for any reason related to your sport?

*This question is required because it determines which questions you are asked later in the survey

- ☐ Yes
- ☐ No

Was this effective in helping your sporting development?

- ☐ Extremely effective

- ☐ Very effective
- ☐ Moderately effective
- ☐ Slightly effective
- ☐ Not effective at all

What are some reasons you might have chosen not to work with a sports psychologist?

- ☐ Too expensive
- ☐ Didn't think it would work
- ☐ Didn't need it
- ☐ Other (please state)

Have you used any sports psychology products?

*This question is required because it determines which questions you are asked later in the survey

- ☐ Books
- ☐ Audio programme
- ☐ Online course
- ☐ Other (please state)
- ☐ Haven't used any

Were these products effective in helping your sporting development?

- ☐ Extremely effective
- ☐ Very effective
- ☐ Moderately effective
- ☐ Slightly effective
- ☐ Not effective at all

What are some reasons you might have chosen not to use sport psychology products?

- ☐ Too expensive
- ☐ Didn't think it would work
- ☐ Didn't need it
- ☐ Other (please state)

For this survey thus far you have only been considering the main sport you competed in during adolescence. Do you have any insights from any other sport or activity that you participated in that you believe would be useful to this research?

*This question is required because it determines which questions you are asked later in the survey

- ☐ Yes
- ☐ No

Please outline any insights from your participation in any other sport or activity that would be relevant to this research

Block 4

What advice would you give to any young athletes to help them achieve their goals?

Block 3

Please take a few moments to consider all of your experiences in sport. If you were able to produce a product or service to help youth athletes achieve their goals, what would you do?

Block 5

Thank you very much for participating in this research

Would you like a copy of the final report?

If you would like to receive a copy of the final report from this research then please contact Jacob Emery at the email address below.

If you have any questions or problems, who can you contact?

If you have any questions, either now or in the future, please feel free to contact either:

Student:	Supervisor:
Name: Jacob Emery	Name: Marc Wilson
jacob.emery@vuw.ac.nz	Role: Professor
	School: Psychology
	Phone: 04 463 5225
	<i>marc.wilson@vuw.ac.nz</i>

Human Ethics Committee information

If you have any concerns about the ethical conduct of the research you may contact the Victoria University HEC Convenor: Associate Professor Susan Corbett. Email susan.corbett@vuw.ac.nz or telephone +64-4-463 5480.

Appendix E

Behavioral Guidelines for Youth Sport Coaches

(Smoll, Smith, & Cumming. 2007)

Reacting to Good Plays and Athletes' Effort

- Do: Provide reinforcement! Do so immediately. Let the athletes know that you appreciate and value their efforts. Reinforce effort as much as you do results. Look for positive things, reinforce them, and you will see them increase. Remember, whether athletes show it or not, the positive things you say and do remain with them.
- Don't: Take their efforts for granted.

Reacting to Mistakes

- Do: Give encouragement immediately after mistakes. That's when the youngster needs your support the most. If you are sure the athlete knows how to correct the mistake, then encouragement alone is sufficient. When appropriate, give corrective instruction, but always do so in an encouraging manner. Do this by emphasizing not the bad things that just happened, but the good things that will happen if the athlete follows your instruction (the "why" of it). This will make the athlete positively self-motivated to correct the mistakes rather than negatively motivated to avoid failure and your disapproval.
- Don't: Punish when things are going wrong! Punishment isn't just yelling. It can be tone of voice, action, or any indication of disapproval. Athletes respond much better to a positive approach. Fear of failure is reduced if you work to reduce fear of punishment. Indications of displeasure should be limited to clear cases of lack

of effort; but, even here, criticize the lack of effort rather than the athlete as a person.

- Don't: Give corrective instruction in a hostile, demeaning, or harsh manner. That is, avoid punitive instruction. This is more likely to increase frustration and create resentment than to improve performance. Don't let your good intentions in giving instruction be self-defeating.

Maintaining Order and Discipline

- Do: Maintain order by establishing clear expectations. Emphasize that during a game all members of the team are part of the activity, even those on the bench. Use reinforcement to strengthen team participation. In other words, try to prevent misbehaviors by using the positive approach to strengthen their opposites.
- Don't: Get into the position of having to constantly nag or threaten the athletes in order to prevent chaos. Don't be a drill sergeant. If an athlete refuses to cooperate, deprive him or her of something valued (i.e., participation). Don't use physical measures, such as running laps. If you establish clear behavioral guidelines early and work to build team spirit in achieving them, you can avoid having to repeatedly keep control. Remember, youngsters want clear guidelines and expectations, but they don't want to be regimented. Try to achieve a healthy balance.

Creating a Positive Learning Atmosphere

- Do: Give technical instruction. Establish your role as a caring and competent teacher. Try to structure participation as a learning experience in which you are going to help the athletes become the best they can be. Always give instruction in

a positive fashion. Satisfy your athletes' desire to improve their skills. Give instruction in a clear, concise manner and, if possible, demonstrate how to do skills correctly.

- Do: Give encouragement. Encourage effort, don't demand results. Use it selectively so that it is meaningful. Be supportive without acting like a cheerleader.
- Do: Concentrate on the activity. Be "in the game" with the athletes. Set a good example for team unity.
- Don't: Give instruction or encouragement in a sarcastic or degrading manner. Make a point, then leave it. Don't let "encouragement" become irritating to the athletes.

Appendix F

Topics Covered in the Parents Workshop

(Smoll, Smith, & Cumming. 2007)

The Mastery Triangle

- A child-centered orientation that promotes cooperation among parents, coaches, and administrators

Youth Sport Objectives and Values

- Goals of youth sports from the perspectives of parents and young athletes
- Differences between developmental and professional models of sport

Achievement in Sports and in Life

- Defining success in terms of mastery versus ego orientations to achievement
- Effects of a mastery-oriented climate on youngsters' personal, social, and athletic development
- Keeping sports in perspective relative to social and academic development, spiritual enrichment, and quality of family life

The Real Meaning of Winning

- A mastery-oriented philosophy of winning

Parent Roles and Responsibilities

- Challenges for parents relative to their youngsters' involvement in sports
(sharing sons/daughters with coaches, accepting children's disappointments, giving children some time)

Combating Athletic Stress

- The nature and consequences of sport performance anxiety
- Reducing fear of failure and avoiding parent-induced stress

Parent Behavior at Sport Events

- Rules for parents' conduct
- Dealing with parents who do not conform with acceptable standards of behavior

Getting Along with Your Child's Coach

- Establishing and maintaining open lines of communication

Youth Sport Issues and Challenges

- Question and answer session

Appendix G

Participants Primary Sport: Study Three

Sport	n
Netball	57
Football (soccer)	35
Hockey	13
Tennis	13
Rugby	12
Swimming	9
Dance	8
Basketball	7
Badminton	5
Gymnastics	5
Volleyball	5
Waterpolo	5
Rowing	4
Running	3
Table Tennis	3
Boxing	2
Cheerleading	2
Kickboxing	2
Archery	1
Crossfit	1
Equestrian	1
Fencing	1
Lawn Bowls	1
Orienteering	1

Roller Skating	1
Sailing	1
Skiing	1
Touch Rugby	1
Underwater Hockey	1
Waka Ama	1
Weightlifting	1

Appendix H

Product Development Questions: Study Three

Previous research in this project has identified the need for a product or service to assist with the psychological challenges of youth sport. For the remaining questions please consider how you might have used this product during your youth sporting career.

If you were to use this product, what medium would you prefer?

☐ Mobile phone app

☐ Website

☐ Online course

☐ Physical book

☐ Other (please explain)

Please rate how appealing you would find each of the following features

	Extremely appealing	Very appealing	Moderately appealing	Slightly appealing	Not appealing at all
A communication function between athletes, their parents and their coaches	☐	☐	☐	☐	☐
The ability to set goals in the most effective ways and track your progress	☐	☐	☐	☐	☐
Techniques and exercises to help you increase your discipline	☐	☐	☐	☐	☐
Techniques to help you increase your motivation	☐	☐	☐	☐	☐
Access to work with a qualified sport psychology directly	☐	☐	☐	☐	☐

Appendix I

Application Developer Contracting Rate

Mobile Developer

Hays Information Technology

Auckland > Auckland Central**Information & Communication Technology** > Engineering - Software

- Auckland CBD
- Cutting-edge technology - great company!
- Up to \$95 p/h +GST

iOS & Android - Contract - Auckland CBD!

Save