Development of a Practical Model for Coaches to use Mental Skills Training to Enhance Psychological Strengths for Athletes

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This thesis is dedicated to my father

Rama,

In the first year of my candidature my father was diagnosed with dementia and caring for him gave me the greatest lessons of my life. From his deathbed, without uttering a word, he was imparting me the knowledge of life. He was one of the reasons for changing the course of my life.

PREFACE

Why was the research in Fiji?

During my visits to Fiji, an opportunity came up for me to stand in for the Under 20's National Football Team coach, who had fallen ill. Later that year, I temporarily took up the Assistant National Coaching role with the Fiji Women's National Football Team. That experience kindled the desire in me to do more for Fiji and the game itself. So, I contacted professor Herb Marsh with a research proposal, little realising that this could change the course of my life.

Subsequently, during my study visits to Fiji, I put my PhD knowledge to good use and volunteered sports psychology services to the Fiji National Football Teams. Here, I implemented the research study intervention model to help prepare the National teams for international games, culminating in the Under 20's National team qualifying for the age group FIFA World Cup finals in 2015, and the Under 23's qualifying for the Rio Olympic Championships in 2016.

There were numerous personal benefits for me from these experiences. I had a wonderful, life-changing journey through this candidature, and was able to overcome 10 years of life struggle that affected me both mentally and physically, prior to my candidature. Professor Herb Marsh literally gave me a lifeline when he accepted my research proposal. I applied the psychological strengths, principles and concepts learned through my studies to not only normalise my life, but also be more productive at work and life in general. Thank you, Herb.

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Lastly but not the least, I am grateful to my family, Kasturi, Vanisha and Alysha Kumar. Thank you for giving me the support over the last few years.

STATEMENT OF AUTHORSHIP AND SOURCES

This thesis contains no material published elsewhere or extracted in whole or in part from a thesis by which I have qualified for or been awarded another degree or diploma.

No parts of this thesis have been submitted towards the award of any other degree or diploma in any other tertiary institution.

No other person's work has been used without due acknowledgment in the main text of the thesis.

All research procedures reported in the thesis received the approval of the relevant Ethics/Safety Committees (where required).

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Table of Abbreviations

ACSI-28	Athletic Coping Skills Inventory
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CG	Competition Goal setting
CI	Competition Imagery
d	Cohen’s d
EASDQ	Elite Athlete Self-Description Questionnaire
EFA	Exploratory Factor Analysis
ES	Effect Size
ESEM	Exploratory Structural Equation Modelling
FSS	Flow Trait Scale
GFI	Goodness of Fit
HTHM	Heterotrait-heteromethod
HTMM	Heterotrait-monomethod
LEQ-H	Life Effectiveness Questionnaire
MST	Mental Skills Training
MTI	Mental Toughness Inventory
MTHM	Monotrait-heteromethod
MTMM	Multitrait-multimethod
NNFI	Non-Normed Fit Index
PG	Practice Goal setting
PI	Practice Imagery
PPI	Psychological Performance Inventory
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analysis
PSIS	Psychological Skills Inventory for Sport
RCFI	Robust Comparative Fit Index
RCT	Randomized Control Trials
RMSEA	Root Means Square
SEM	Structural Equation Modelling
SRMR	Standardized Root Mean Square Residual

TLI	Tucker Lewis Index
TOPS 2	Test of Performance Strategies
TOPS 2S	Test of Performance Questionnaire (Short Form)

THESIS ABSTRACT

This thesis investigated the effectiveness of mental skills training. A meta-analysis (Study 1) was conducted to examine the existing evidence on mental skills training interventions: goal setting, self-talk, relaxation, imagery and multicomponent as performance enhancing strategies in the sporting domain. A total of 128 studies with 684 effect sizes were included in the final meta-analysis. Overall, mental skills training had a moderate, positive association with performance outcomes (d = .72, 95% CI = [.60, .85]). The I^2 analysis showed that 18% of the variation was attributable to differences within study and 70% was attributed to between studies. Mental practice length was a significant moderator, showing that comparatively shorter duration of mental practice improved performance more substantively.

An intervention research approach was undertaken to investigate the effectiveness of the mental skills training with football players in Fiji. Test of Performance Strategies, short form (TOPS 2S) was developed (Study 2) and utilised for the intervention in a cross-cultural setting in Fiji (Study 3). There were three parts in the intervention study, which examined the following: the cross-validation of the TOPS 2S (Part A); intervention effects on mental skills use (Part B1), psychological strengths (mental toughness, self-concept, life effectiveness, and flow, Part B2); and football performance (Part C). Part A, the cross-validation results, showed that the TOPS 2S had consistent moderate reliability and acceptable (Hu & Bentler, 1999) fit indices. Part B, the quantitative component of the intervention study, showed the significant intervention effect on the use of goal setting, self-talk, relaxation and imagery. Furthermore, there were mediation effects on the psychological strengths; mental toughness, self-concept, flow, and life effectiveness. Part C, the qualitative component of the intervention, was the school coaches' perception of the intervention, and the findings demonstrated that the "train the trainer" model was an effective form of intervention delivery

for the players, as well as coaches. The coaches reported that the multicomponent program not only helped the players improve their football performance, but also enhanced their well-being. Coaches, who were classroom teachers, incorporated mental skills programs in their teaching practice to enrich student learning, and reported personal gains such as better emotion regulation and improved classroom and behaviour management.

CHAPTER 1

Introduction and Overview

Athletes and coaches are under ever-increasing pressure for high quality performance due to the increased corporate and public expectations, and are continually searching for ways to improve performance, even in the face of stressful athletic competitions. The increasing pressure for athletes to perform could come from many areas, such as high expectations from fans, coaches, parents, and colleagues, or from athletes' fear of negative evaluation and protecting their image (Vealey, Low, Pierce, & Quinones-Paredes, 2014).

Over the years, athletes have physically worked very hard, and they have looked for mind training to get a competitive edge and improve their sports performance. Performance is becoming more and more competitive, and players are sometimes required to play many consecutive matches (Nédélec et al., 2012). Many variables besides simple physical fitness and ability have been shown to play a role in determining performance. At the elite level, athletes' technical, tactical, and physical skills are often very close to being evenly matched, leaving the outcome of the competition to be determined based on their psychological strengths.

Research has largely shown that mental skills have a salient role in developing psychological strengths (Bertollo, Saltarelli, & Robazza, 2009; Hardy, Roberts, Thomas, & Murphy, 2010; Thomas, Murphy, & Hardy, 1999), such as mental toughness (Connaughton, Hanton, & Jones, 2010; Gucciardi, Gordon, Dimmock, & Mallett, 2009; Thelwell, Weston, & Greenlees, 2005), self- concept (Marsh, Hey, Roche, & Perry, 1997), flow (Jackson, Thomas, Marsh, & Smerthhurst, 2001), and life effectiveness (Neill, 2008). It is widely believed that performing at an optimal level in sport requires a positive and present-focused mindset so that mental strategies are purported to represent a significant determinant of athletes' performance (Birrer & Morgan, 2010), as well as a potentially influential force in the development of the psychological strengths that are so important to performance (Connaughton, Wadey, Hanton, & Jones, 2008; Crust & Swann, 2011; Gucciardi & Gordon, 2011; Jackson et al., 2001; Thelwell, Greenlees, & Weston, 2006). Beyer (2016) further stated that, at the optimal level, elite athletes are more successful due to their higher confidence level, better concentration, and low anxiety, whereby these qualities can be enhanced with mental skills training (MST).

Athletes, coaches and other stakeholders acknowledge the importance of mental skills and psychological strengths in enhancing performance. For such attributes to develop, however, there is a need to focus on the mechanisms at play. In particular, cognitive mental skills (imagery, goal setting, self-talk, and relaxation) known to play a role in athletic performance (Gucciardi Gordon, & Dimmock, 2009a; Hardy et al., 2010; Howland, 2007; Mathers, 2009; Thelwell et al., 2005; Vealey, 2007) may also influence furthering and maintaining psychological strengths among athletes (Connaughton, Wadey, Hanton, & Jones, 2008; Crust & Swann, 2011; Gucciardi & Gordon, 2011; Jackson et al., 2001; Thelwell, Greenlees, & Weston, 2006). Over the past decade, extensive research has been evident on the use of various mental skills in optimising performance (Blumenstein, Orbach, Bar-Eli, Dreshman, & Weinstein, 2012; Evans, Jones, & Mullen, 2004; Harwood, Cumming, & Fletcher, 2004; Johnson & Gilbert, 2004; Voight, 2005).

Over the years, mental skills training research has significantly evolved, resulting in a plethora of research on mental skills in sports (Freitas, 2012). Evidence suggests that mental skills can be developed via structured training programs (Behncke, 2004; Blakeslee & Goff, 2007; Freitas, 2012) and that such training can help athletes achieve and maintain peak performance more often and with greater consistency (Frey, Laguna, & Ravizza, 2003; Howland, 2007). There has been, however, very little scientific research designed to explore the implications of these mental skills programs on psychological strengths.

An important contributing factor for successful implementation of such a structured program largely depends on the coaches, especially for team sports such as football, where they are required to put together a successful training program to create a positive environment to win competitions (Michel, 2013). Predominantly, coaches have recruited sports psychologist consultants to assist them in developing and implementing psychologically based training programs to optimise their athletes' or team competitive performances (Zakrajselk, 2004). Vealey (2007), however, states that coaches delivering such programs could be more effective and recommended implementation of such programs in their training environment. Coaches would need to be trained in the delivery of these programs. The "train the trainer" is a successful educational model widely acclaimed to adequately prepare facilitators such as coaches to effectively implement structured psychological programs to their athletes (Orfaly et al., 2005).

Hence, the present intervention research (presented in Study 3) adopted this model to test hypotheses that athletes' mental toughness, self-concept, life effectiveness, and flow can be enhanced because of a mental skills training program. Exposure to the mental skills program was hypothesized to improve the athletes' use of mental skills. It was predicted that this, in turn, would enhance psychological strengths. In sporting terms, the mediation effect of the mental strategies was hypothesized to lead to improvement in competitive performances. Mental skills intervention has been shown to enhance the use of mental strategies (Garvin, 2014), and that could have a mediating role in improving psychological strengths and, thus, the sports performance. This thesis explored the effect of mental strategies on the outcomes stated above. It further examined the juxtaposition of a mental skills training program, use of mental strategies, and sports performance. It was anticipated that a meta-analysis (study 1) would significantly contribute to our understanding of the relationship between mental skills training and sports performance. The main objectives of this thesis were to attain a good knowledge and understanding of the effects of the use of these strategies on sports performance, psychological strengths, health, and well-being.

An important prerequisite for this research, however, was the ability to rely on strong psychometric measures for the constructs of interest. The longitudinal research process in the intervention study utilised a comparatively comprehensive battery of measures. These questionnaires were the Mental Toughness Inventory (MTI), Elite Athlete Self- Description Questionnaire (EASDQ), Life Effectiveness Questionnaire (LEQ), Flow questionnaire (FSS), and Test of Performance Strategies (short form - TOPS 2S). The administration of these instruments and a study outline are briefly stated below.

The first study (Study 1), a meta-analysis, sets the tone of the thesis with a comprehensive examination of the current trend in mental strategies used by athletes, coaches and teams for sports performance. It is aligned well with the intervention and the psychometric studies. The second study (Study 2) critically examined psychometric properties of the Test of Performance Strategies (TOPS 2), a popular instrument for the measure of the psychological skills athletes employ in different settings, such as competition and during practice. From this assessment, a robust, reliable and valid short form of this instrument was developed (the need to develop a shorter version TOPS is discussed in the mental skills section of literature review). This short form instrument was used in Study 3 with the battery of instruments to examine the effects of the mental skills training on athletes' mental toughness, self-concept, life effectiveness, and flow.

An outline of thesis chapters is as follows: Chapter 1 introduces the topic and gives a general overview of this doctoral research. Chapter 2 presents relevant literature and aims, objectives, and the significance of this thesis. This chapter sets the framework for the intervention study. Chapter 3 (Study 1), presents a meta-analysis of studies that examined the relationship between psychological skills and sports performance. Chapter 4 (Study 2) presents the short form of the Test of Performance Strategies (TOPS 2S) questionnaire. This chapter critically examined the psychometric properties of the original TOPS 2 data and presents a robust, reliable, and valid short form (TOPS 2S) of this instrument. Chapter 5 (Study 3) presents detailed information on the intervention study conducted in Fiji. Chapter 5 comprises three parts: Part 3A investigated the cross-validation of the TOPS 2S from Fiji data; Parts 3B and 3C present thorough quantitative and qualitative evaluations of the intervention in Fiji, respectively.

CHAPTER 2

Literature Review

One of the main objectives of sport psychology is to understand the effects of psychological factors on sports performance of athletes (Gee, 2010; Weinberg, Freysinger, & Mellano, 2018; Weinberg & Gould, 2007), with optimising performance as the most important goal (Noetel, Ciarrochi, Van Zanden, & Lonsdale, 2017). Psychologists implement interventions that also examine social and psychosocial aspects that alter performance (Brown & Fletcher, 2017). It is widely reported in the literature that mental skills are effective in helping athletes with optimal performance (Munroe-Chandler, Hall, Fishburne, Murphy, & Hall, 2012). Even though athletes seem to generally acknowledge the benefits of these skills, very few invest time in acquiring the skills (Garvin, 2014). This may be due to their inability to access such programs, whether through lack of knowledge or through resources being readily unavailable.

However, a better understanding of the mediators underpinning the performance improvement may be a good motivator for these athletes and their coaches to embrace mental strategies in their training repertoire. Having the knowledge of the underpinning factors of optimal performance may give athletes and coaches a better understanding of the relationship between mental skills and sports performance. Hence, athletes and coaches are likely to adopt a more positive approach to a training program that would increase the use of mental strategies and enhance consistent optimal performance (Foster, 2017). The current research aims to give better insight into the effectiveness of athletes' use of mental strategies and enhanced psychological strengths for optimal performance.

Psychological Strengths

Research has shown that athletes need psychological strengths such as mental toughness (Connaughton et al., 2010; Gucciardi et al., 2009; Thelwell et al., 2005; Weinberg, Butt, & Culp, 2011), self- concept (Marsh, 1998), flow (Jackson, Thomas, Marsh, & Smerthhurst, 2001), and life effectiveness (Gould & Voelker, 2010; Neill, 2008) to influence their performance. Coaches and athletes' understanding of the psychological underpinnings of mental toughness in athletes are important to enhance performance as well as combat the prevalence of mental health problems that could impact sports performance (Zeiger & Zieger, 2018). Zieger and Zieger (2018) further iterated that besides success in sports, athletes could also benefit with improved sleep quality, higher control and interpersonal confidence, and healthier lifestyle. These desirable qualities of mental toughness led its inclusion into the psychological strength's dependent variable. Mental toughness can be developed by practicing mental skills such as goal setting, self-talk, mental imagery and relaxation (Etnier, 2009). Etnier's recommendation to athletes is that "you must make mental skills training a part of your preparations so that mental toughness becomes one of your strengths" (p.7).

Self-concept is examined in relation to sports performance due to the extant literature frequently positing it as a mediating variable that facilitates with the notion of self-belief/confidence, the attainment of healthy behaviours such as, exercise adherence, or physical fitness through its influence on task choice, motivation, sustained effort, intentions, and persistence (Marsh, 2006). The investigation on self-concepts of elite athletes could provide some knowledge as to athletes' perception on themselves, and how those self-perceptions affect performance and health outcomes (Middleton, 2007). For this reason, there is value in reviewing self-concept as a possible component of psychological strengths.

There is also a performance experience aspect of sports activity; an important psychological dimension underlying this peak performance is the experience of flow (Middleton, 2007). The flow has been identified as a psychological variable that has been explicitly linked with the achievement of peak athletic performance (Middleton, 2007) and therefore it is logical to include it as a possible component of psychological strengths. It is worthwhile considering the relevance of flow as a psychological strengths construct.

Life effectiveness has been explicitly linked with the achievement of peak athletic performance and therefore has been included as a possible component of psychological strengths. There is a widespread belief that sport participation promotes the capacity to deal with life’s challenges and hence is beneficial, especially for youths (Goudas & Giannoudis, 2008). Evidence suggests that many of the skills required to succeed in sport are transferable to other life contexts (Hardcastle, Tye, Glassey & Hagger, 2015). These skills may include skills such as; goal setting, self-talk, coping with success and failure, emotional control and self-esteem (Danish, Taylor, Hodge, & Heke, 2004; Gould and Carson's, 2008; Hardcastle, Tye, Glassey & Hagger, 2015). For ease of reference, the term “psychological strengths” represents the character strengths associated with the characteristics of mental toughness, self-concept, life effectiveness and flow. These characteristics are explained further below in respective sections.

Psychological strengths are important determinants of athletes’ competitive performance and are also useful in other areas of their lives. However, they are hard to teach. Some researchers have shown that mental skills training can impact psychological strengths such as mental toughness (Gucciardi et al., 2009a) and flow (Jackson et al., 2001), therefore making mental strategies doubly useful for both athletic performance and personal life. Additionally, researchers have shown that mental skills intervention increases the use of mental strategies (Garvin, 2014; Gould et al., 1990). Further research findings have shown that the mediating effect of mental skills usage has subsequently led to positive performance outcomes and increases in self-efficacy (Garvin, 2014). Understanding mediating variables could help coaches and athletes identify appropriate training programs; however, there are very few practical mental skills intervention studies on this topic (McCormick et al., 2015). Ponnusamy, Lines, Zhang, and Gucciardi (2018) conducted a latent profile analysis on athletes' use of mental skills and reported that their findings provided indirect support for a positive association between mental toughness and mental skills training.

The current research explored the mediating role of mental skills training in developing and enhancing mental toughness, self-concept, life effectiveness, and flow.

Mental toughness. Mental toughness is the most common term used by athletes and coaches in relation to athletes' performance in training and competitions. It is also largely accepted that the present demanding nature of most professional sporting codes requires athletes to have persistent mental toughness to get to, and stay at, the top (Bull, Shambrook, James, & Broks, 2005; Middleton, Martin, & Marsh, 2011; Weinberg, Freysinger, Mellano, & Brookhouse, 2016). Gucciardi (2017) stated that competitive advantage and success resonates very well with mental toughness.

Since the 1980s, researchers have become interested in mental toughness training that can give athletes that added psychological edge over their competitors. Mental toughness is a multi-dimensional psychological construct comprising of cognitive, affective, and behavioural components, such as values, attitudes and emotions that are related to successful sports performances (Crust & Azadi, 2010; Golby & Sheard, 2004; Gucciardi, 2012; Middleton, 2007). It has been widely accepted as an important characteristic for athletic success (Connaughton et al., 2008; Crust & Swann, 2011; Middleton, Marsh, Martin, Richards, & Perry, 2004a; Nicholls, Polman, Levy, & Blackhouse, 2009). Numerous researchers (Clough, Earle, & Sewell, 2002; Gucciardi, Stamatis, & Ntoumanis, 2017; Jones, Hanton, & Connaughton, 2002; Middleton, Marsh, Martin, Richards, & Perry 2004b) have expanded on the early work of Loehr (1986) to provide a platform for better theoretical understanding of mental toughness and its attributes. Recently, Gucciardi (2017) questioned the conceptualisation and measurement of mental toughness and provide key methodological issues that contribute to building this concept. It is important to first discuss the past work and common aspects of mental toughness to get a good understanding to the concepts contributing to the theory and then followed by the most current work.

Loehr (1982) pioneered the research on mental toughness, and he highlighted that at least 50% of athletes' success was due to mental processes that reflect mental toughness. His investigations were generally based on coaching and practical applications, as well as observations of elite athletes he worked with rather than on any scientific or sound empirical platform. However, his conceptualisation of mental toughness produced nine characteristics that formed the basis of later studies: self-motivated and self-directed, positive and realistic, in control of their emotions, calm and relaxed under fire, highly energetic and ready for action, determined, mentally alert and focused, self-confident and fully responsible.

Clough and colleagues (2002) further operationalized the mental toughness concept and adopted both the theoretical framework from Loehr's investigation and the medical model of hardiness conceptualised by Kobasa, Maddis, and Kahn (1982) to develop a mental toughness framework similar to hardiness. The hardiness framework conceptualised by Kobasa and colleagues (1982) encompassed three key components: control (when faced with a potentially stressful situation, an individual will be able to take the most appropriate course of action to turn around the threatening situation to a more acceptable one), commitment (when an individual becomes more proactive rather than passively accepting a situation), and challenge (when an individual sees a stressful situation as a challenge rather than a problem). Clough and colleagues added the fourth dimension, confidence (when an individual is able to remain unaffected by negative life experiences) to Kobasa's three hardiness components to produce the 4Cs model of mental toughness in sports (Crust, 2007). However, Clough and colleagues' operationalization did not clearly define mental toughness, leaving open questions such as "what is mental toughness?" and "what are the characteristics of mental toughness?" Researchers then predominantly turned to Jones, Hanton, and Connaughton's (2002) conceptual definition of mental toughness.

Jones and colleagues (2002) provided a conceptual definition of mental toughness that is widely accepted by researchers. They undertook a three-stage qualitative study to explore the definition of mental toughness with ten international performers as participants from a diverse representation of biological sex and sport, and they defined mental toughness as having the natural or developed psychological edge that enables you to:

- Generally, cope better than your opponents with the many demands (competition, training, and lifestyle) on a performer.
- Specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure (p. 209).

Participants in Jones and colleagues' (2002) study identified 12 key attributes of mental toughness. These attributes listed in rank order are: (1) having an unshakable self-belief in the ability to achieve competition goals; (2) bouncing back from performance setbacks and having increased determination to succeed at the competition- specific attribute; (3) having an unshakable self-belief of possessing unique qualities and abilities that are better than the opponents; (4) being internally motivated and having an overpowering desire for success; (5) being totally focused in the task at hand, not on the competition-specific distractions; (6) regaining composure and psychological control after unexpected and uncontrollable events; (7) maintaining technique and effort during training and competition by pushing back the boundaries of physical and emotional pain; (8) knowing that you can cope with competition anxiety and accepting that it is inevitable; (9) being able to cope with others' good or bad performance and not being adversely affected by it; (10) thriving on the pressure of competition: (11) blocking out personal problems and maintaining focus in the face of personal distractions; (12) switching a sports focus on or off when necessary and required for specific situations. In addition to other characteristics, a winning mentality with a strong desire to win is a key attribute of mental toughness (Coulter, Mallett, & Gucciardi, 2010).

The definition operationalized by Jones and colleagues (2002) not only identified a mentally tough performer as one who copes with adversities to perform well, but also one who has a high level of ability in controlling stress, motivation, confidence, focus, and attention. Another important dimension of mental toughness discussed by Jones and colleagues (2002) was athletes' general ability to deal with many demands placed upon them by themselves and society due to their sporting and personal lifestyle.

Jones, Hanton, and Connaughton (2007) also recognised the mental toughness characteristics that can possibly explain why some athletes thrive on challenges and competition and can easily bounce back from failures and adversities. Jones and colleagues (2007) further explored these issues with super elite performers as participants who had won at least one gold medal at an Olympic Games or world championship and included coaches and sport psychologists who had coached or consulted with Olympic or world champions on a long-term basis. These super-elite participants verified Jones and colleagues' (2002) definition of mental toughness as an accurately worded and close representation of their personal understanding.

Connaughton and colleagues (2010) further investigated the development and maintenance of the mental toughness construct that could be generalised to various sporting codes. Eleven of the 15 respondents representing a broad sample of sports from Jones and colleagues' (2007) study participated in their investigation. Connaughton and colleagues (2010) addressed the development and maintenance of mental toughness through three development phases with one maintenance phase, which is the maintenance year. The development phases included initial involvement to intermediate; mental toughness development begins during the initial involvement to intermediate phase [3-6 years], with the mindset of belief and focus and using long-term goals as motivation followed by pushing the self to the limit. Intermediate to elite level is from 6-10 years, where the majority of the subcomponents of mental toughness develop, these being: staying focused, belief, regulating performance, controlling the environment, awareness and control of thoughts and feelings, handling pressure, and handling success and failure. Elite to Olympic or world champion status is the peak development stage and is where all 13 subcomponents of mental toughness develop to their highest levels.

The findings in Connaughton and colleagues' (2010) study showed that super elite development and maintenance phases of mental toughness comprised various mental skills training programs. For example, the initial involvement to intermediate level revealed the use of long-term goals for motivation as a strategy for developing mental toughness. Connaughton and colleagues have not categorised goal setting as a mental skill, however, goal setting is a significant component of mental skill training and it is an important mental toughness developmental strategy (see Gucciardi et al., 2008; Mathers, 2009; Thelwell et al., 2005.

Another study relevant to my intervention research, conducted by Middleton (2007), investigated the mental toughness concept to determine the specific characteristics of mental toughness and to get a better understanding of the interrelationship between these characteristics. Middleton (2007) used a diverse representation of sports to define and identify the key characteristics of mental toughness. He found that the dominant view was that mental toughness seems to exist in the presence of or in response to adversity, and the overarching notion was in relation to overcoming that adversity. During this research, a mental toughness inventory (MTI) was developed by Middleton and colleagues (2004b), which measured 12 mental toughness characteristics: self-efficacy, mental self-concept, potential total focus, perseverance, task familiarity, personal bests, task value, goal commitment, positivity, stress minimisation, and positive comparisons.

Gucciardi (2017) raised concerns about the conceptualisation and measurement of mental toughness and stated that it has been problematic. He further stated that there is confusion and disagreement regarding the meaning, distinctiveness and usefulness of mental toughness in sport which has led to some researchers challenging its legitimacy as a scientific construct. Gucciardi (2017) stated that earlier work (for example, Jones et al, 2002; Jones et al., 2007; Connaughton et al., 2010) defined mental toughness in terms of one's opponents whereas the current research such as Gucciardi et al. (2015) extended the terminology to incorporate subjective or goal directed dimensions. Gucciardi (2017) proposed an operational definition of mental toughness as a "state-like psychological resource that is purposeful, flexible, and efficient in nature for the enactment and maintenance of goal directed pursuits" (p.18). This definition encompasses the idea that individuals experience a range of challenging or stressful circumstances during their goal directed pursuits (Gucciardi, 2017).

Numerous researchers (Gucciardi, Hanton, Gordon, Mallett, & Temby, 2015; Ponnusamy et al., 2018) have identified that mental toughness could be enhanced through use of mental skills training. Gucciardi and colleagues (2017) examined the buffering effect of mental toughness on athletic experiences and found a moderate to large positive association between mental toughness and psychological experiences. They also stated that mental toughness has protective effects against life stressors. Ponnusamy and colleagues (2018) found that athletes' mental toughness increased because of the mental skills training they received. Weinberg and colleagues (2018) stated that coaches could build athletes’ mental toughness by teaching them mental skills.

Flow. Flow is an optimal psychological state of concentration, characterized by extreme focus and absolute absorption in an activity. The performer becomes totally connected to the performance due to the positive experiential state that occurs in the situation, where personal skills and abilities are equal to the required challenges and demands of the task (Eklund, 1994; Jackson & Marsh, 1996; Jackson et al., 2001; Stavrou, Jackson, Zervas, & Karteroliotis, 2007). It is associated with positive emotion and is described as those moments when everything comes together for the performer (Jackson & Eklund, 2002). Csikszentmihalyi (1990) described it as the optimal mental state that involves total absorption in the task in which one is engaged. Characteristics of flow could also resonate with high levels of performance attributes, such as being focused, emotional activation, feelings of confidence, and growing confidence (Eklund, 1994). Globally, flow has been regarded as a special psychological state that is associated with motivation and enjoyment (Jackson, 2012). Flow has been conceptualized as a source of mental energy that can be used for constructive purposes such as to focus attention (Csikszentmihalyi, 1997; Jackson, 1992; Jackson et al., 2001; Stavrou et al., 2007).

An athlete who is in a “flow” state (or also sometimes referred to as “in the zone”) will effortlessly and consistently perform at their peak and experience flashes of intense living and effortless action, with these moments standing out as the best in their lives (Csikszentmihalyi, 1997). During flow, athletes are totally in tune with their performance whereby they experience complete concentration and knowledge of performance, clear focus on goals (Ersöz & Eklund, 2017), and a feeling of being in control (Jackson & Marsh, 1996). Their skills are fully involved in overcoming the challenges (Csikszentmihalyi, 1997). The experience seems perfect for the athletes, and they would want it to last forever (Csikszentmihalyi, 1997). Moments such as these are what characterize flow.

When the challenges and skills are perceived to be in balance, athletes can stretch their capabilities to learn new skills and increase self-esteem and personal complexity. This enables athletes to continue with performance without being bored or anxious (Stavrou et al., 2007). Stavrou and colleagues (2007) claimed that where there is an imbalance between skills and challenges, athletes can do several things to reach a flow state. Firstly, they can try to increase their personal skills to balance the level of challenge, or they can try to seek more challenging situations. If the challenges are too great, then the athletes can return to the flow state by learning new skills to overcome the challenges. If the challenges are too low, then the athletes can get back into the flow by increasing the level of challenges to remain motivated (Csikszentmihalyi, 1997). To continue experiencing flow, the athlete must continue to build more skills to encourage greater complexity and more challenging situations (Stavrou et al., 2007). Frequent flow can lead to a desire to perform that activity for its own sake, which becomes autotelic (Csikszentmihalyi, 1990; Jackson, Kimiecik, Ford, & Marsh, 1998).

Flow is clearly a desirable athletic characteristic where centeredness of mind optimises an experience (Jackson, Martin, & Eklund, 2008), and it can determine the positive outcome of a competition. Jackson (1992) investigated the flow experiences in figure skaters to get an insight into the nature of flow and found that the most important factors for getting into flow included a positive mental attitude, positive pre-competitive and competitive affect, maintaining appropriate focus, and physical readiness. She also found that physical problems, mistakes, negative mental attitude, and an inability to maintain focus prevented flow in athletes. Eklund, Gould, and Jackson (1993) explored the individual differences among six medal-winning wrestlers of the 1988 United States Olympic Wrestling team, and found that individuals used various mental preparation plans, including relaxation, self-talk, and breathing control to obtain an optimal state of performance.

In another study, Jackson and colleagues (2001) examined the psychological factors of possible relevance to athletic flow experiences and their effects on optimal performance. A total of 236 athletes representing the three sports of orienteering, surf life-saving, and road cycling participated in their study. The findings indicated that there were positive relationships between flow, self-concept, and psychological skills. They also found that those athletes' positive self-perceptions and the experience of flow were due to the strategic use of psychological skills (Jackson et al., 2001). Lindsay, Maynard, and Thomas (2005) conducted an intervention study and reported that mental skills (i.e., relaxation and imagery) improved athletic cycling performance. The relationship between flow and performance is drawing a lot of interest amongst athletes, coaches, and sport psychologists.

Notwithstanding the advances in the flow research "there is a degree of uncertainty as to when flow states occur" (Chavez, 2008, p.71). Chavez (2008) stated that there are two fields of thoughts: (a) many researchers believe that flow state may be voluntarily controlled or can be increased in intensity. If this is the case, then it is important for the researchers to investigate the psychological and physiological factors that can influence flow; and (b) some researchers believe that flow just happen.

Swann (2016) argues that this uncertainty as to when flow occurs posits challenges in assessing the experience accurately. Swann (2016) stated that due to the movement involved in most sporting activities it is difficult to collect data on flow experience and that most researchers' measure flow after it has occurred. There are three ways flow data has generally been collected: (a) interviews. Swann (2016) stated that interviews rely on memory of events and athletes accounts could be subject to forgetting or biased recall of their experiences; (b) questionnaires. Swann (2016) argued that there are limitations to this method and questioned the appropriateness of objectively measuring subjective state of flow. He further stated that "over-reliance on questionnaires could reduce these optimal states to numbers and lose the richness of athletes' experiences; (c) Experience Sampling Method. This method employs a strategy that collects data closer to the flow experience (Swann, 2016). This method requires athletes to wear an electronic device during an activity that records signals of flow characteristics.

Recently, there has been more research on flow and its characteristics (Alla & Ajibua, 2012; Jackson & Eklund, 2002; Kee & Wang, 2008; Russell, 2001; Schuler & Brunner, 2009; Schuler & Brandstatter, 2013; Stavrou et al., 2007), and it is surprising that there is little research on how to train and prepare athletes for this state. Extant literature on mental skills (Gucciardi et al., 2008; Gucciardi et al., 2017; Harmison, 2006; Thelwell & Greenlees, 2001; Thelwell & Maynard, 2003) shows that the use of mental skills can regulate mental energy and enhance attentional focus. The present research used a mental skills training program to further explore the relationship between mental skills and flow experience.

Self-concept. Self-concept is a person's perception of himself or herself (Marsh & Shavelson, 1985). This perception, built through experiences, can be influenced by evaluations by significant others, environmental reinforcements and attributions of their behaviours (Marsh & Shavelson, 1985; Shavelson, Hubner, & Stanton, 1976). A person's perceptions of himself or herself can influence how he or she acts. Therefore, it is vital for athletes to perceive themselves in a positive way that can enable them to get to the flow state and remain in that zone for a considerable time during competition to achieve success.

Marsh, Perry, Horsely, and Roche (1995) explain that self-concept is multifaceted and hierarchically structured, and one common model places general self-concept at the top of the hierarchy. Self-concept is further divided at each level of the hierarchy into specific components of self-concept. The next level is divided into academic and non-academic components with non-academic self-concept again divided into social, emotional, and physical domains (Byrne, 2002; Marsh at al., 1995). Initially academic branch of the model was favoured and subsequently construct validity studies were focused in this area (Byrne, 2002). Byrne (2002) postulated that the non-academic aspects were given attention much later and primarily concentrated on social and physical components of the model. Marsh and his colleagues work was instrumental in providing structure and measurement instruments on physical self-concept (including athlete self-concept) and hence this sentiment gained considerable attention since the 1990’s due to the inception of multifaceted and hierarchical structures modelled for general self-concept (Byrne, 2002; Esnaola, Infante, & Zulaika, 2011; Klomsten, Skaalvik, & Espnes, 2004; Marsh, 1998: Marsh & Perry, 2005; Marsh, Richards, Johnson, Roche, & Tremayne, 1994). Physical self-concept is directed towards person’s own self and makes reference to the assessment of one’s effort (Klein, Fröhlich, & Emrich, 2017). Klein et al. (2017) further posits that in terms of sport, self-assessment of athleticism or physical performance would attach a lot of importance since it is an innate characteristic to provide intensive analysis and individual differentiation of the physical self-concept.

A study by Marsh, Perry, Horsely, and Roche (1995) compared the multidimensional self-concepts of elite athletes to the general population and found that elite athletes had much higher physical ability self-concept than non-athletes, and they also scored higher in social self-concept. Findlay and Bowker (2009) later examined the relation between sport and the multidimensional nature of self-concept and found that level of athleticism, whether elite or non-elite, was positively related to physical competence and self-concept.

At the elite level, athletes perceive themselves to be more effective and capable of achieving targeted goals and are more likely to wholeheartedly commit to achieving those goals. They have a strong desire to meet their personal standards and strive for success and win at all times, and they tend to have higher positive self-concept due to this sport orientation (Findlay & Bowker, 2009). Positive self-concept is a desirable outcome in many disciplines of sport psychology, and in sport performance it is regarded as the mediating factor that facilitates desirable outcomes such as physical skills, physical activities, and health related physical fitness (Klein, Fröhlich, & Emrich, 2017; Marsh, 1998; Marsh, Papaioannou, & Theodorakis, 2006; Marsh & Perry, 2005; Modroño & Guillen, 2016).

Sport participation has a positive influence on a person’s self-concept and can also lead to increased commitment and involvement. It adds time and commitment to academic pursuits, personal adjustments, and life effectiveness (Holland & Andre, 1987; Marsh, 1993; Slutzky & Simpkins, 2009; Tatlow-Golden & Guerin, 2017). Marsh and colleagues (1994) examined the effects of sport participation on growth and changes in high school students and found that sport participation had a very robust and significant positive influence on a person’s social self-concept, academic self-concept, educational aspirations, and school attendance, thus lending to the suggestion that positive self-concept can facilitate optimal performance. Tatlow-Golden and Guerin (2017) examined the relationships between most valued activities and self-concept and found that individuals mostly valued sports that built personal development and were challenging.

Jackson and colleagues (2001) indicated that psychological skills could be a contributing factor that positively influences self-concept and ultimately facilitates successful performance for athletes. Parise, Canzi, Olivari, and Ferrari (2019) examined the link between self-concept and psychological adjustment and found that there was indirect self-concept clarity through emotion regulation. They stated that with higher self-concept clarity, individuals would be able to manage negative emotional states and respond well in stressful situations.

An important factor to consider in relation to self-concept and physical performance is whether it is the self-concept that enhances performance or is it the enhanced performance that increases a person's self-concept. Three studies (Marsh, Chanal, Sarrazin, & Bois, 2006; Marsh, Gerlach, Brettschneider, Trautwein, & Ludtke, 2007; Marsh & Perry, 2005) tested the generalizability of the reciprocal effects model of academic achievement and self-concept to the sport setting. Marsh and colleagues (2005; 2006; 2007) found that sport self-concept and sport performance were both determinants and consequences of each other. Self-concept and sport performance were reciprocal and mutually reinforced each other. Hence, improvements in performance could lead to a higher self-concept and higher self-concept could enhance performance. Marsh and colleagues (2007) also argued that it would be futile if educators only focused on performance or on enhancing self-concept without addressing the other component. For example, if only athletes' performance is targeted, and their self-concept is not increased, then it is possible that the gains in performance will be short lived. Mental skills training can perhaps provide the continuum to maintain the balance discussed by Marsh and colleagues (2007).

There is an abundance of research on self-concept (e.g., Cetinkalp, 2012; Marsh, Martin, & Jackson, 2010; Marsh et al., 2006); however, there is limited research and knowledge available on intervention programs such as those targeting mental strategies in relation to athlete self-concept. The self-concept measure of athletes in relation to mental strategies can provide an important insight into the factors that can influence self-concept and, thus, enhance sport performance. My intervention research addressed the relationship between these strategies and participation in a mental skills training program. It was envisaged that this training program would increase the frequency of mental skills usage by athletes and that it could have a positive effect on athletes' self-concept.

Life effectiveness. Life effectiveness as a desirable outcome of sport participation has been of considerable interest (Gould, Griffes, & Carson, 2011). It refers to how well a person is equipped to handle the pressures of life and their capacity to adapt, survive, and thrive in society (Neill, 2008), as well as cope with the demands of life (Gould et al., 2011). Numerous researches (e.g., Forneris, Danish, & Scott, 2007; Gould & Voelker, 2012; Jones, Dunn, Holt, Sullivan, & Bloom, 2011; Larsen, Alfermann, & Christensen, 2012; Sharp et al., 2013; Weiss, 2008) have acknowledged that sport participation has the potential to enhance life skills and personal development. Moreover, Gould, Flett, and Lauer (2012) reported that a more caring and mastery-oriented environment enhances positive player development. Sports setting has become a good platform for fostering and developing life skills program and promote youth development.

Development of like skills such as, behavioural (e.g., effective communication with peers), cognitive (e.g., making effective decisions) and interpersonal (e.g., being assertive) skills could be developed through a good sports training program (Hardcastle, Tye, Glassey & Hagger, 2014). Hardcastle et al. (2014) stated that there is evidence that life skills programs such as “SUPER” and “Going for the Goal” showed that many skills acquired through these were transferable to other aspects of daily living. Although programs such as “Going for Goal” may be very effective life skills program, it may not be readily embraced by the coaches as it may not be specific to their sports and needs to be administered as an addition to their sports training program. “SUPER” differs from “Going for Goal” as it is taught like sports clinic with activities relevant to specific sports (Papacharisis et al., 2005). There is however, very little research on the effectiveness of “SUPER”.

Gould, Collins, Lauer and Chung (2007) voiced concern that while researchers have focused on performance enhancement strategies for successful athletes, they have less often studied strategies coaches employed for development of life skills. Researchers are now examining the development outcomes of extracurricular activities such as sports; however, there is scant research in the specific strategies’ coaches use to develop life skills (Gould et al., 2007).

Many coaches train their athletes to excel during competition and, in the process, subsequently also teach them life effectiveness skills. Mental skills with a focus on personal development allow athletes optimal psychological functioning through feelings of self-concept (Marsh et al., 1995), well-being, and relatedness to others (Foster, 2017; Vealey, 2007). Vealey (2007) stated that coaches should employ athlete-centred programs that also focus on life development skills outcomes. A study by Gould, Collins, Lauer, and Chung (2007) examined an in-depth phone interview study with 10 outstanding football coaches and found that while coaches were highly focused on winning, their top priority was the personal development of their players. According to Gould and Carson (2008), positive youth development involves youths acquiring diverse competencies that not only benefit then in sports performances but also in their current and future endeavours.

Another study by Papacharisis, Goudas, Danish, and Theodorakis (2005) showed that athletes exposed to a structured life skills sports program with components that focused on goal setting, problem solving, and positive thinking, indicated higher self-belief, social responsibility, emotional intelligence, goal knowledge, and social interest. Moreover, they performed better in their chosen sports. This life skills intervention program (Papacharisis et al., 2005) is similar to the current intervention and it was expected that athletes exposed to mental strategies would also indicate enhanced life effectiveness components, as discussed by Papacharisis and colleagues (2005).

Sports programs are generally considered to be a very popular activity among youths, and with that the increase in the youth sport participation has created significant socialization opportunities for these children (Papacharisis et al., 2005). Participation in sports can be associated with emotional development of players since they experience both negative and positive emotions, and these become a contributing factor in a person’s life effectiveness (Camire, Trudel, & Benard, 2013).

Sports experiences can form the basis of character values such as responsibility, risk taking, courage, conformity, persistence, and self-control (Papacharisis et al., 2005), and children learn competencies, assets, values, and life skills that will significantly influence their personal development and life effectiveness (Jones et al., 2011). The life experiences learned in sports are personal internal assets and characteristics such as goal setting, emotion regulation, self-esteem, and hard work ethic (Gould & Carson, 2008), and are essential to have to successfully deal with the demands and challenges faced on a day-to-day basis. These experiences form the foundation of life effectiveness.

Research Framework and Theoretical Overview

The current research framework aligns well with Vealey (2007), who provided a conceptual overview and advocated a complex, multilayered, and integrative approach to mental skills training (Freitas, Dias, & Fonseca, 2013; Paquette, 2009). Vealey's (2007) model depicted foundation, performance, team skills, and personal development as the four major targets of psychological training. Freitas (2012) argued that these four major targets for mental skills training were very important for success in sports performance, as well as athlete and coach well-being. Vealey (2007) described foundation skills as interpersonal resources such as *achievement drive* (a compelling drive and persistence to succeed in spite of obstacles and problems), *productive thinking* (ability to manage emotions and thoughts to facilitate success and well-being), *self-awareness* (ability to self-examine, both retrospective and introspective, to be able to understand their thoughts, feelings and behaviours), and *self-confidence* (belief that one has the ability to achieve success).

The second major target of psychological training is performance skills. According to Vealey (2007), these are mental abilities crucial for execution of skills for sports performance and include *perceptual-cognitive skills* (cognitive knowledge structure that shows athlete ability for tactical and strategic decision-making in sport), *attentional focus* (ability to sustain focus of attention critical for successful performance), and e*nergy management* (ability to maintain mental and physical energy levels for optimal performance).

Vealey (2007) described personal development skills, the third major target for psychological skills training, as significant maturational markers of personal development. She stated that two personal development skills, *identity achievement* (having a clear sense of identity that promotes feelings of well-being and self-worth) and *interpersonal competence* (being able to communicate and interact effectively with others), are important in sport.

The fourth target for mental skills training, team skills, are collective qualities of the team that determine the overall performance success (Vealey, 2007), and include *team confidence* (belief that the team has the ability for successful performance), *cohesion* (team's ability to remain united in pursuit of their goals), *communication* (interaction within the team for team success), and *leadership* (ability to influence others in the team for team success).

Vealey's model was based on using more holistic approaches and on principles of inclusiveness that embraced the fundamentals of psychological skills training, process, coach effectiveness, and social-cultural repercussions (Freitas, 2012; Paquette, 2009). The process showed the integrative hierarchical approach to developing mental skills, which is largely based on the coach/consultant's philosophy that determines the model type employed in the program (Vealey, 2007).

The hierarchical layering begins with coaches'/consultants' philosophy of intervention approach (Vealey (2007) that is crucial to drive the players' behaviour change (Poczwardowski, Sherman, & Ravizza, 2004). The three main philosophical differences include educational versus clinical approaches, program-centred versus athlete-centred approaches, and performance enhancement versus personal development approaches (Vealey, 2007). The model encourages an athlete-centred program based on the social and cultural aspects that could positively influence the physical training process. The coaches' familiarity with the techniques and strategies would also determine the mental practice model chosen for their program.

The second layer in Vealey's intervention process is characteristics and structure of the program. This involves the framework of the mental skills training intervention from which mental strategies and techniques are delivered and implemented (Vealey, 2007). The third layer is the identification of the strategies that emerge from the coach or consultant's philosophy and intervention model (Freitas, 2012). Vealey (2007) referred to strategies as the organisational plans of action or the practical packaging of mental training techniques that forms a coherent and integrative training program. Techniques comprise the final layer of Vealey's recommended intervention process, which she referred to as specific procedures or methods used in mental skills training (Freitas, 2012). These methods include the tools for mental training, such as goal setting, imagery, and relaxation techniques (Vealey, 2007). In numerous studies, these mental techniques have been referred to as mental strategies (Thelwell, Weston, & Greenless, 2010) and mental skills (Garvin, 2014). This thesis has adopted the later approach to the terminology and uses "strategies" and "skills" interchangeably with "techniques." Moreover, Vealey's (2007) characteristics of her four major targets and integrative hierarchical approach to developing mental skills are prevalent in the intervention research component of this thesis.

Mental Skills Training

Defining mental practice. Mental skills training is used interchangeably with mental practice in this thesis. Researchers have defined mental practice differently and it is important to examine this concept's prevalence in the literature. Mental practice is poorly understood and there is some confusion and uncertainty regarding mental practice efficacy (Ietswaart, Butler, Jackson, & Edwards, 2015). Some researchers (e.g., Driskell et al., 1994; Etnier & Landers, 1996; Hinshaw, 1991) have defined mental practice exclusively as visualisation or mental imagery in which the procedure requires a cognitive rehearsal of a task in the absence of any physical movement. Others (Austin & Miller, 1992; Cirimele, 2010; Guerra, Bellose, Faria, & Lucchetti, 2018; Wilkes & Summers, 1984) have a broader representation of mental practice and, thus, include any type of mental preparation in absence of overt physical movement. Yiasemidou and colleagues (2017) stated that mental practice requires cognitive processes to work together and can be a demanding process.

The broader definition of mental practice shares the same objective of enhancing performance (as described by proponents of visualization and imagery) and includes strategies such as psyching up, attention to focusing, relaxation, self-talk, and other forms of cognitive preparation strategies, in addition to imagery (Cirimele, 2010). Cirimele (2010) stated that in such endeavours, athletes use their intellect, cognitive skills, and imagination with a range of techniques, such as goal setting, imagery, cognitive coping strategies, and behavioural coping strategies. Guerra and colleagues (2018) stated that psychological strategies such as imagery and cognitive-specific tasks are generally used as mental practice. This thesis aligns with the broader term of mental practice that includes the mental preparation procedure where one or more mental skill is utilized in absence of overt physical movement.

Mental Skills Review

Vealey (2007) described mental skills as the desired outcomes that are expected to improve performance and personal well-being. In sports, mentals skills training is primarily used for competitive performance; however, a secondary outcome is that it enhances individuals' sense of well-being (Foster, 2017). Vealey (2007) further suggested that mental skills training embrace the concepts of a model that effectively utilises appropriate mental strategies and techniques. Mental skills training is the systematic and consistent practice of mental skills to enhance performance, increase enjoyment, and achieve greater sport and physical activity self-satisfaction (Birrer & Morgan, 2010). Put simply, there is both empirical and theoretical evidence to suggest that mental skills trainings are an important pathway towards building psychological strengths and raising sports performance.

Mental skills training has proven to be instrumental in helping athletes achieve their best (Beauchamp, Harvey, & Beauchamp, 2012; Gucciardi & Gordon, 2011; Howland, 2007; Sharp, Woodcock, Holland, Cumming & Duda, 2013; Norman, 2012). Furthermore, meta-analyses have consistently established that optimal performance is associated with mental skills, such as mental imagery (Beedie, Terry, & Lane, 2000; Driskell et al., 1994), self-talk (Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011), goal setting (Kyllo & Landers, 1995), and relaxation (Paterson, 1987; Pelka et al., 2017). McCormick, Meijen, and Marcora (2015) conducted a systematic literature review and found that imagery, self-talk, and goal setting improved endurance performance. These meta-analyses are further discussed in the mental skills framework section below.

Taylor, Gould, and Rolo (2008) investigated 176 United States participants in the 2000 Sydney Summer Olympic Games and found that the medallists more frequently employed mental skills and strategies in both practice and competitive environments than non-medallists did. Interventions, such as arousal, relaxation, goal setting, mental imagery, and focusing were some of the most common techniques used by the psychologists, coaches, and athletes to enhance athletes’ performance (Hardy et al., 2010; Howland, 2007). With the considerable knowledge and widely accepted belief that mental skills training increases psychological strengths and performance, there seems to be some emphasis given by athletes, coaches, and sports administrators in this area. Coaches and sports administrators are now looking for more knowledge and are gaining expertise in developing and implementing mental skills training programs.

The demanding nature of most professional sporting codes requires athletes to have persistent psychological strengths to consistently perform well at the top level (Bull, et al., 2005). At their peak, performers should be able to stay relaxed and focused even when feeling pain and fatigue, and psychological strengths can help athletes to attain these objectives. There is a need to address mental skills as a significant influence on psychological strengths. In addition to their physical training, the athletes are now encouraged to incorporate mental skills training to determine their progress and survival in the competitive world today.

Numerous research studies show that the psychological aspects of a training program enhance mental toughness, performance, and skill in sport (Behncke, 2004; Crust, 2008; Greenleaf, Gould, & Diffenbach, 2001; Howland, 2007; Jackson et al., 2001; Rose, 2010; SooHoo, Takemoto, & McCullagh, 2004). Thelwell and colleagues (2006) examined the effects of mental skills training on the performance of five male football (soccer) players and found that there was a significant improvement in their performance. The players' first touch, tackling, and percentage of accurate passing improved post-intervention. Another study by Gucciardi and colleagues (2009a) focused on mental skills training as a determinant of mental toughness. They investigated the effects of mental skills training on the performance of Australian Football League players and found that there was significant improvement in performance and mental toughness scores for these athletes. Recently, the increasing number of intervention studies has identified positive performance effects of mental skills training in helping athletes achieve their best (Brown & Fletcher, 2017).

Mental skill interventions, such as, relaxation, goal setting, mental imagery, and self-talk are some of the most common techniques that can nurture the qualities that characterise psychological strengths (Birrer & Morgan, 2010; Howland, 2007; Mathers, 2009; Shackell & Standing, 2007). It should reflect the athletes', coaches', and the organisation's set of beliefs and values, as well as the program objective and outcome (Vealey, 2007). There are numerous mental skills used to enhance athletes' performance, but it is important to choose the most promising and adaptable skills that meet the athletes' demands (Birrer & Morgan, 2010).

There is also a wide range of mental skills training models in the literature. Selecting the appropriate model is necessary to present the overall picture and direction that the athletes, coaches, and sport organisations undertake to reach their objective (Vealey, 2007). A good program will enable an athlete to perform under pressure and remain confident and resilient when competition conditions get tough (Gucciardi, Gordon, & Dimmock, 2008; Gucciardi et al., 2009). The training model should not only focus on the athletes' performance outcome, but also examine other important outcomes such as their personal development and life effectiveness.

A key issue in the athletes' performance could be self-constructs such as self-awareness, self-efficacy, self-worth, self-confidence, personal development and life skills, copying skills, communication, and leadership skills. Mental skills training could facilitate athletes' self-monitoring, which enables them to be more aware of their feelings and thoughts (Amirault, 2000) and has potential to improve their training behaviours (Alqallaf, 2016). These issues influence sport performance and should be reflected in the mental skills training program (Birrer & Morgan, 2010; Vealey, 2007). It is proposed here that a manageable, well-sequenced, coherent, and practical training model can bring about these outcomes (Vealey, 2007). The literature review below briefly examines the training model and the program delivery applicable to the current research.

MST Model

It is notable that over the years there has been a shift from early mental skills training interventions of ad hoc approaches that focus on single mental skills, to specific mental strategies and techniques based on a multidimensional model of mental skills approach (Burton, Pickering, Weinberg, Yukelson, & Weigand, 2010; Cumming & Hall, 2002; Hamilton, Scott, & MacDougall, 2007; O'Brien, Mellalieu, & Hanton, 2009; Salmon, Hall, & Haslam, 1994; Sheard & Golby, 2006; Suedfeld & Bruno, 1990). There are numerous single skill models (behavioural management and sport-specific mental skills models) based on theoretical psychological emphases to give readers a better understanding of the broad scope of mental skills training in the literature (Vealey, 2007). However, Vealey (2007) recommended a multicomponent model with useful strategies that is based on philosophical foundations and valued by coaches and athletes. The multicomponent approach should be based on a comprehensive process with an overall framework to guide the intervention (see the framework in section below).

Many researchers (see Thelwell et al., 2005; Thelwell & Greenlees, 2003) agree that the qualities that characterise consistent optimal performance can be nurtured through a combination of mental skills, such as, goal setting, mental imagery and relaxation. However, there has been a lack of rigorous scientific research on the implications and effectiveness of the multidimensional approach to training mental skills in developing psychological strengths in athletes that ultimately can determine successful sports performance.

Multidimensional mental skills training program in sport. It is evident that single-skill interventions can be effective in enhancing athletic performance; however, it may limit responsiveness from participants due to their individual differences (Blakeslee & Goff, 2007). The four basic mental techniques (imagery, goal-setting, self-talk and relaxation) are predominantly used in sport psychology interventions, generally combined as multimodal package, which incorporates a combination of these basic techniques (Birrer & Morgan, 2010). In team sports, it is feasible to combine single skills into a multicomponent package. Several psychological techniques can be combined into a package when delivering mental skills intervention in sports (Fournier, Calmels, Durand-Bush, & Salmela, 2005; Papaioannou, Ballon, Theodorakis, & Auwelle, 2004). Multicomponent interventions with two or more mental skills, such as goal setting and self-talk (Papaioannou et al., 2004), imagery and goal setting (Hughes, 1990), imagery and relaxation (Afrouzeh, Sohrabi, Haghkhan, Rowshani, & Goharrokhi, 2015; Coelho et al., 2012), and a combination of goal setting, imagery, relaxation, and self-talk (Blakeslee & Goff, 2007; Brewer et al., 1995; Horn et al., 2011), have been found to be more effective in improving sports performance when compared to single skill-based interventions.

Multicomponent interventions can target numerous performance outcome measures, such as motivation, energy and anger management, self-confidence, attentional focus, and productive thinking (Vealey, 2007). The versatility of the multicomponent model makes it a more viable intervention program compared to stand-alone single-skill models.

Researchers (Greenspan & Feltz, 1989; Papaioannou et al., 2004; Zervas & Kakkos, 1995) have compared single-skill interventions to combined packages and reported the superiority of combined interventions. Papaioannou and colleagues (2004) investigated the effect of goal setting and self-talk with 41 elite footballers and found that the combined condition was more effective, and the performance was also more quickly enhanced, when compared to a single-skill approach to the intervention. Weinberg, Seabourne, and Jackson (1987) examined the Visuo-Motor Behaviour Rehearsal (VMBR), effects of imagery preceding relaxation on 42 self-defence students and reported that the VMBR sequence produced significantly better performance compared to other conditions. They believed that combined sequence employs relaxation to pave the way for imagery by reducing distractibility, and, thus, aids in recall for a more vivid and clear visual representation. Devonport, Lane, and Biscomb (2013) reported that self-regulation techniques, such as cue words and relaxation techniques could be helpful in attaining long-term goals.

There is a plethora of evidence of the effectiveness of stand-alone single mental skills training in enhancing athletic performance. However, there is isolated research into the combined effects of two or more frequently used skills. The present intervention study narrowed that gap and examined the effects of a combination of the four most widely used mental skills technique mentioned above.

Vealey (2007) suggested that mental strategies in sport must also have a social and cultural perspective to address many issues that arise with athletes and coaches. A competitive edge and performance success are the primary outcome for mental strategies in sport; however, there is a need to address the wider personal and professional issues that athletes and coaches encounter. Hence, a model that also gives focus to the personal development of athletes is warranted. A multicomponent approach can provide the conditions in which athletes may be able to further explore and address many issues that may not be possible or may be limited with the single mental skill approach.

MST delivery

Another significant aspect of a good training program is the delivery of the intervention. It is evident from the literature that mental strategies are being largely developed and administered by sports psychologists (Gucciardi et al., 2009a). They also may need to be in contact with the athletes and coaches regularly to easily monitor the training program. Moreover, athletes and coaches’ acceptance of the psychologists can largely determine the effectiveness and the success of the program (Zakrajsek, 2004). Sports psychologists go beyond their traditional role and provide therapy for distressed or impaired athletes and offer interventions such as mental strategies or communicate with coaches in providing other relevant services such as treating clinical issues (Stapleton, Hankes, Hays, & Parham, 2010). Experienced sports psychologists have greater understanding of values and attitudes of the people at all levels of the sporting organisation (Brown, Gould, & Foster, 2005). The broader context of their scope of work includes the hierarchical structure of the sport, such as who makes the decisions critical for work at an organisational level and being accepted into a sporting culture (Holder & Winter, 2017). Recently the research on quality assurance procedures in the practice of sport psychology and appropriate training programs have generated detailed insight into characteristics associated with effectiveness of the practitioners (Eubank, 2016; Thelwell, Wood, Harwood, Woolway, & Van Ralte, 2018). When sports psychologists demonstrate high interpersonal skills, elevated levels of competence, and specific skill development as part of their qualifications, their preference by coaches and their marketability in sports settings increases (Stapleton et al., 2010; Thelwell et al., 2018).

However, it may be challenging and expensive for many sports organisations to hire and pay psychologists for their services, particularly at the sub-elite level. Coaches' primary reasons for not employing psychologists were reportedly cost and lack of availability (Austin, 2013). Athletes' attitude towards sports psychologists can also determine whether coaches may hire them for their services. Zakrejsek (2004) stated that even with the title of sports psychologist, many athletes viewed them as counsellors or mental health professionals who examine vulnerabilities and weaknesses, which then can become a barrier to athletes' acceptability of the services.

Consequently, researchers (Freitas, 2012; Vealey, 2007) are calling for coaches to deliver programs to their athletes. Vealey (2007) further suggested that mental skills are more easily taught and learned by athletes if integrated into their normal training program. Integrating mental skills training into athletes' normal training program would minimise the impact of time constraints. Athletes would be able to use the mental skills with their physical training rather than allocating separate isolated time.

Coaches have a good grasp of the technical, tactical and physical training requirements of the sport so that the strategies can have a greater impact. Moreover, coaches have significant influence over their athletes and repeated exposure to the program could improve mental skills abilities (Shaffer, Tenenbaum, & Eklund, 2015). So, a viable option may be to use a “train the trainer” model (Nakamura et al., 2014; Orfaly et al., 2005) to equip coaches to integrate mental strategies into their normal training program.

Train the Trainer Model

Train the Trainer is an educational model that is widely utilised in many areas (Orfaly et al., 2005), including sports. This model is effective in training a high volume of trainers, thus improving their knowledge and capacity to deliver the training to others (Madah-Amiri, Clausen, & Lobmaier, 2016). Weingarten and colleagues (2018) stated that this mode of training the trainers is cost effective and provides a quicker way to disseminate information. It involves an expert upskilling of the providers or trainers to implement and train others in the intervention (Kilpela et al., 2014). The trained provider then takes on the responsibility of training and teaching the skills to others (Zandberg & Wilson, 2013) which, consequently, will greatly reduce time, resources, and staff necessary to teach mental strategies to athletes (Nakamura et al., 2014). A further advantage of this model of propagating information is that it also allows more children to receive the program (Weingarten et al., 2018). This process of delivery may generate a higher participation rate from the athletes, as it is a segment of their normal training rather than a stand-alone training program. Furthermore, athletes will get input from their coaches on when and how to use them. If a sports psychologist was to deliver the mental skills training program, it would generally be an isolated program and the fallout of that could be that the coaches and athletes might feel that it is too time consuming and is taking them away from their normal training program. Coaches have control over many facets of athletes’ lives (Barcza-Renner, Eklund, Morin, & Habeeb, 2016), and if the program was delivered by their coaches, athletes would be more receptive to the program. Moreover, athletes would be compelled to practice the skills to gratify their coaches.

A recent meta-analysis by Brown and Fletcher (2017) examined the psychological, social, and psychosocial interventions of athletes on variables relating to their sports performance and found that their performance improved because of the interventions delivered by coaches. Brown and Fletcher (2017) is the most contemporary of the statistical reviews on mental skills training. Its inclusion criteria included randomised control trials and evaluated the effects of an intervention that involved any action or process that used individual thought and behaviour (e.g., self-talk), social factors (e.g., teambuilding), or both individual thought and behaviour and social factors (e.g., coach providing performance feedback).

Scherzer (2004) found that when their athletic trainers were trained to deliver mental skills programs, athletes felt more confident to use the skills more often. Scherzer (2004) also found that these trainers were able to retain the information longer and deliver the skills to their subjects, one-year post workshop. These are very promising findings by Scherzer (2004), as this is desirable outcome that could not only lend success to the current intervention, but also enable coaches to embrace this program for future use. However, there is scant empirical research on the Train the Trainer mode of intervention studies in sports psychology.

For the current intervention research, a model was adopted where the coaches were trained and provided with education, instructional tools, and program guidelines on mental skills that enabled them to provide the intervention to the athletes. The skills were taught and practiced during the players' normal training sessions where they had the opportunity to select appropriate skills that matched their needs. The intervention research (Study 3) entailed mental skills training incorporated into the training program by the coaches in the training environment, as well as for the players to practice in other settings such as home and during competition.

Four predominant mental skills targeted for current intervention study

Training programs should be systematic, goal-oriented, and structured to provide a controlled environment that fosters the desired outcomes (Garvin, 2014). This allows athletes to respond to their training routines in a more productive and focused manner (Vealey, Low Peerce, & Quinones-Paredes, 2014). The four most widely used basic performance enhancing mental skills in the literature are: mental imagery, relaxation, self-talk, and goal setting (Birrer & Morgan, 2010; Sadeghi, Omar-Fauzee, Jamalis, Ab-Latif & Cheric, 2010). A combination of the four basic mental skills gave shape to the multidimensional structure to the current intervention.

Use of mental imagery in sport. Mental imagery is a process where sensory experience is stored in memory and internally recalled in many different situations, such as competition, training, and rehabilitation, in the absence of external stimuli (Gould, Voelker, Damarjian, & Greenleaf, 2014) which can effectively influence performance (Bernier & Fournier, 2010; Morris, Spittle, & Watt, 2005). Gould et al. (2014) stated that the feel of the movement in sport is very important and therefore imagery may involve the bodily awareness and all the five senses including sight, touch, taste, sound and smell.

Imagery training happens when individuals perform the skill or rehearse a task and experience the action in their mind (Taktek, Zinsser, & St-John, 2008). The essential component of imagery involves the image, the somatic response to the image, and the meaning of the image (Gould et al., 2014). The mind forms an image and serves as the training ground to manipulate the mental image’s effects on overt behaviour (Hinshaw, 1991). This is sometimes referred to as mental practice (Driskell et al., 1994; Hinshaw, 1991).

Research has shown that imagery is very effective in enhancing sports performance (Gould, et al., 2014), and it is the most widely researched and predominantly used by athletes (Morris et al., 2005). Gould and colleagues (2014) further added that imagery cannot be developed overnight, and commitment to the training program is necessary to gain performance benefits.

Athletes mostly use imagery for learning and refining strategies for competition preparation, such as mental warm-ups, and to familiarise themselves with venues and coping with numerous stressors (Vealey, 2007). Williams and Cumming (2012) stated that mental imagery has been used by athletes to regulate their emotions and activation levels, manage cognitions and motivational drive, and refine skills and strategies to enhance their performance. These imagery benefits could be aligned with principles of youth development, and coaches could consider this beyond sport participation by promoting transfer of these skills to enhance athletes' personal and physical development (Jacobs & Wright, 2016).

Numerous meta-analyses have shown a favourable effect of mental imagery on performance. A meta-analysis conducted by Hinshaw (1991) which included 21 studies and 44 effect sizes and obtained an overall effect size of 0.68. Meta-analyses from Feltz and Lander (1983), which included 60 studies and 146 effect sizes, produced an overall effect size of 0.48, while the Driskell and colleagues' (1994) study that included 40 studies and 62 hypothesis tests obtained an overall effect size of 0.53. Results from these meta-analyses indicate that mental imagery has positive and significant effects on sports performance.

Furthermore, these meta-analyses' (Driskell et al., 1994; Hinshaw, 1991) results also indicate that the length or duration of mental imagery is a significant moderator variable. At the meta-analytic level, moderating effects of mental practice on performance can be assessed by examining conditions such as the duration of mental practice (Driskell et al., 1994). Hinshaw (1991) reported higher effect sizes for practice sessions of less than one minute and between 10 and 15 minutes in length, compared to sessions of three to five minutes in length. Driskell and colleagues (1994) found that there was a decrease in beneficial effect with increase in overall length of mental imagery practice. They recommended approximately 20 minutes of mental imagery training for optimal performance. Feltz and Lander’s (1983) findings concurred with both the above results and showed that practice sessions under one minute or between 15 and 25 minutes produced the largest effect sizes. Feltz and Lander also reported large effect sizes for studies that had less than six or between 36 and 46 trials per practice sessions. The meta-analysis in Chapter 3 will further explore this concept.

Imagery training has shown to be effective in improving performance on strength, motor, and cognitive tasks (Vealey, 2007). Studies such as an investigation by Salmon and colleagues (1994) explored the use of mental imagery by 362 American football players and found that, in general, all players reported using mental imagery to prepare for competition and to rehearse individual skills. Their study indicated that football players who were instructed to use imagery to enhance performance practiced harder and longer than the control group, and that the elite players used this technique as a motivational tool to better maximise its effects (Salmon et al., 1994). A study on the use of mental imagery by three male midfield elite football players showed that players were better able to control future football actions (Jordet, 2005). These football players were able to make better use of their technique and receive the ball in better positions, act more quickly, and get more time with the ball (Jordet, 2005). Blair, Hall, and Leyshon (1993) investigated the effect of imagery training on 22 skilled and 22 novice football players and found that their serial motor and discrete skills improved. They also found that the players’ response time also increased, subsequently enhancing performance. Blair and colleagues commented that novice players would have benefitted more from the imagery training; since the skilled players were already efficient, there would be very little room for their improvement. In another experiment, Munroe-Chandler and Hall (2004) found that imagery intervention increased collective efficacy of 13 female football players. Seif-Barghi and colleagues (2012) also found 69 football players' passing performance improved due to imagery practice.

Confidence is an important characteristic of football players. An investigation by Munroe-Chandler and colleagues (2008) with 122 young football players indicated that imagery was a significant predictor of self-confidence and self-efficacy in football performance. Munroe-Chandler, Hall, Fishburne, and Shannon (2012) investigated the use of cognitive-specific imagery and demonstrated that 143 young football players improved their performance.

Use of relaxation in sport. Relaxation is described as mental or physical skills used to cope with anxiety and arousal experienced by athletes (Kudlackova, Eccles, & Dieffenbach, 2013) that promote stress reduction, the elimination of tension throughout the body, and a calm and peaceful state of mind (Ford-Martin, 2005). Hampson, King, Eriksson, and Smee (2018) stated that relaxation response defines a set of psychological and physiological mechanisms that improve self-efficacy and provide a buffer against physiological consequences of stress. Relaxation techniques, such as controlled breathing (Gould et al., 1993), reduce tension in athletes and can be useful and helpful for athletes to manage and regulate their energy levels (Vealey, 2007). Some of the ones most frequently used are progressive muscle relaxation (Bernstein, Borkovic, & Hazlett-Stevens, 2000; Jacobson, 1974), breathing exercises (Gould et al., 1993), and guided meditation (Solberg et al., 2012). Jacobson discovered that a person could eliminate the muscle contractions and experience a feeling of deep relaxation by attending to and discriminating between the resulting sensations of tension and relaxation when systematically tensing and releasing the muscle groups (Bernstein et al., 2000). Relaxation affects both the mind and the body, and when properly practiced, allows automatic function and optimal performance.

Gould, Eklund, and Jackson (1993) carried out in-depth interviews with the United States Olympic Wrestling Team and reported that the Olympians used several coping strategies for effective performance. Vealey stated that successful athletes regularly use this strategy to help them perform at their best. Researchers are now incorporating relaxation in combination with other techniques with a multicomponent approach (Vealey, 2007) to obtain maximum benefits for athletes.

Solberg and colleagues (2012) studied 31 male runners for six months in three groups, namely autogenic training (this technique involves daily practice for about 15 minutes where the practitioner will repeat a set of visualisations that induce a state of relaxation and can help alleviate symptoms of stress), practising meditation group, and control group. They found that the group practicing meditation showed a decrease in lactate after exercise, and they surmised that this may be due to reduced anxiety from relaxation effects of the training.

A study by Horn, Gilbert, Gilbert, and Lewis (2011) examined a 10-week mental skills training intervention called UNIFORM with a community college softball team and found that the athletes significantly increased their performance with the application of relaxation. Another relaxation study by Ford and Garza (2009) investigated the effects of slow, deep breathing techniques on the anxiety and performance of four members of a NCAA Division I collegiate softball team ranging from 18 to 21 years of age, and their results of the five-week program showed that the players' performance anxiety decreased significantly, and the players felt in control of the game when they managed their breathing patterns.

A meta-analysis of 27 studies by Manzoni, Pagnini, Castelnuovo, and Molinari (2008) evaluating the efficacy of relaxation training showed a medium to large effect size of 0.57 for the treatment of anxiety. The studies included in their meta-analysis identified progressive muscle relaxation, autogenic training, applied relaxation, and meditation as having a positive and significant effect on treatment for anxiety. A systematic review of 21 studies on relaxation techniques in sport by Pelka, Heidari, Ferrauti, Meyer, and Pfeiffer (2016) reported significant improvement in sports performance. They found that relaxation techniques such as progressive muscle relaxation, yoga, aerobic exercise, and breathing techniques were prevalent in these studies. In another meta-analysis of 71 studies, Paterson (1987) reported an effect size of 0.31 for progressive muscle relaxation as an effective relaxation for performance.

Hashim, Hanafi, and Yusof (2011) investigated effects of two different relaxation techniques, progressive muscle relaxation and autogenic relaxation, utilising 16 adolescent football players. They found that these techniques reduced confusion, depression, fatigue, and tension. They stated that performance can be facilitated when negative moods are reduced, and positive ones enhanced through relaxation.

Use of self-talk in sport. Self-talk is a widely researched topic in sports, and findings have demonstrated that it is an effective strategy that positively influences performance (Coulter et al., 2010; Hamilton et al., 2007; Hardy, 2006; Weinberg, Miller, & Horn, 2012). Self-talk is one of the treatment approaches developed within the cognitive behaviour therapies that aims at changing individuals' thoughts, interpretations and behaviours (Hatzigeorgiadis, Zourbanos, Glanis, & Theodorakis, 2011). The mechanisms and processes of self-talk involves focusing on desired thought and giving self-instructions to initiate an action or series of actions that leads to the desired behaviours (Hatzigeorgiadis, Zourbanos, & Theodorakis, 2007; Johnson, Hrycaiko, Johnson, and Halas, 2004). It has been defined as a multidimensional concept where athletes' verbalisations are addressed to themselves, and this can serve a motivational or instructional function (Hardy, Hall, & Hardy, 2005; Jason, 2015). Instructional self-talk refers to attention focus, technical information, and tactical choices, while motivational self-talk refers to confidence building, effort input, and mood enhancement (Hatzigeorgiadis, et al., 2007). Self-talk can help athletes rectify their mistakes during performance and help them to maintain appropriate levels of attentional focus (Landin & Hebert, 1999). Many training techniques, such as reframing, cognitive restructuring, and thought stopping, are associated with self-talk and are used in multicomponent interventions (Vealey, 2007).

Evidence of self-talk effects on performance enhancement has been prevalent in the sport psychology literature for some time (Edwards, Tod, & McGuigan, 2008; Landin & Hebert, 1999; Latinjak & Torregrosa, 2011; Son, Jackson, Grove, & Feltz, 2011; Weinberg et al., 2012). A meta-analytic review by Hatzigeorgiadis and colleagues (2011) comprising 32 studies with 62 effect sizes revealed a positive, moderate effect size of 0.48.

According to Hardy and colleagues (2005), motivational self-talk has three specific functions for athletes: to psych themselves up, to relax, and to control their arousal. A self-talk study by Hamilton and colleagues (2007) looked at the effects of positive and negative self-talk on endurance performance of nine university students with little cycling experience. They randomly assigned the students to one of the three conditions: positive self-talk, self-regulated assisted positive self-talk, and assisted negative self-talk. The results of the research showed that positive self-talk, whether self-regulated or assisted, was an effective strategy to enhance performance. Another study carried out by Son and colleagues (2011) showed that eight undergraduates who were assigned to a positive self-talk intervention improved their dart-throwing performance.

Burton, Gillham, and Glenn (2011) used comprehensive battery questionnaires to explore the self-talk dimensions utilising 214 adolescent female football players and found that positive self-talk received the greatest effectiveness and was generally used to refute negative thought processes. An investigation by Johnson, Hrycaiko, Johnson, and Halas (2004) showed that all four female participants in their intervention study improved their football shooting performance because of self-talk strategies. Amirault’s (2000) research encouraged participants to log their self-talk as a strategy to self-monitor and become aware of its effect on their feelings and performance. These examples show that positive self-talk intervention has been generally well supported and can lead to athletes acquiring the skill more rapidly and staying motivated for longer periods during training or competition.

Use of goal setting in sport. A goal is the object or aim of an action that an individual tries to accomplish and in the process attain specific standard of proficiency (Locke & Latham, 2002; Weinberg, 2014). Goal setting is a motivational tool to enhance performance and assumes that a person can perform the task (Brown, 1999). It is a specific target that one strives to achieve (Vealey, 2007) and has been widely and effectively used in organisational and clinical settings to enhance performance and productivity (Maitland & Gervis, 2010).

Locke and Latham (2002) deduced that there were four mechanisms through which goals affect performance: (a) directive function. This is when goals influence performance by directing attention and effort towards the goal relevant task and away from irrelevant activities. For example, Weinberg (2014) stated that when a basketball player sets a goal to improve certain aspects of his game, such as improve field goal percentage, foul shot percentage or assists, then his focus and attention shifts to these specific areas; (b) energizing function. Higher goals lead to greater effort when compared to low goals; (c) enhancing persistence. Weinberg (2014) stated that long-term goals can be achieved by setting short-term goals and seeing progress towards it. Hence this would lead to maintaining motivation both on day-to-day bases as well as over time; (d) gaining knowledge and learning new strategies. Developing relevant learning strategies as a goal can influence performance (Weinberg, 2014). Weinberg (2014) stated that coaches and athletes can put strategies in place to meet their desired goals.

A systematic training program that incorporates goal setting enables athletes to plan and evaluate their progress (Vealey, 2007), which helps them to keep focus on their target achievement goals. Systematically setting goals encourages effort and intensity and enhances athletes' development and problem-solving abilities, which prepares them to overcome adversities (Vealey, 2007: Vealey & Campbell, 1988). However, if the ability and knowledge is not inherent for the task to be performed, thus creating complex tasks, then such goals are bound to lead to a decrease in performance rather than enhanced performance (Brown, 1999).

Literature on goal setting reveals that goals are generally described as long-or short-term goals (Stratton, 2005). Long term goals are ultimate or outcome goals. For example, an athlete may aspire to play professionally or compete at world events such as the Football World Cup or Olympics. Short term goals are process or performance goals and are action oriented to help build up to their ultimate goals. Goals can also be classified as difficult or easy. Brown (1999) stated that difficult goals would lead to higher levels of performance compared to no, vague, or easy goals. According to Brown (1999), there are three main reasons for increases in performance due to setting specific, difficult goals it provides direction, regulates effort as more energy is generated for difficult goals, and leads to persistence to achieve these goals.

A goal setting study by Smith, Hauenstein, and Buchanan (1996) showed that specific goal setting can lead to greater performance improvements, and people with higher goal commitment will have higher rates of improvement. Munroe-Chandler, Hall, and Weinberg (2004) explored the specific types of goals that athletes set for themselves and used open-ended questionnaires to elicit responses from 249 volunteer athletes representing 18 different sports, with 80% of the athletes at elite level. They noted that competition athletes generally set objective goals such as winning and beating an opponent, whereas for training the athletes set subjective goals, such as having fun, training effectively, and making the most of the training. They also found that athletes set different types of goals for training and for competition. Munroe-Chandler and colleagues (2004) reported that competition athletes set goals primarily for execution, while in training it was primarily for skill development. Locke and Latham (2002) summarised 35 years of empirical research, including experimental, quasi-experimental, and correlational designs, on goal setting and reported that performance increased with specific difficult goals for over 100 different tasks involving more than 40,000 participants. This was irrespective of whether the goals were assigned or self-set (Locke & Latham, 2002).

A meta-analysis of 36 studies with 136 effect sizes by Kyllo and Landers (1995) evaluating the efficacy of goal setting showed a low to moderate effect size of 0.34 in improving sports performance. They found that moderator variables, absolute and combined short-and long-term goals, produced the largest effects. Their results showed that absolute goals had the greatest effect size of 0.93. However, this effect size may not be conclusive, as this was based on only six studies. Further studies may need to look at this trend for a definitive evaluation to be made. It is not in the scope of the current study to explore this aspect of goal setting. There is, however, ample evidence that goal setting is a successful technique that leads to improvement for sports performance over baseline measures (Kyllo & Landers, 1995).

To get a better understanding of goal setting and to identify the goal setting processes Brobst and Ward (2002) conducted an intervention study that included three female high school football players and found the players performance improved as a result of incorporating goal setting. They stated that the coach reported noticeable improvement in players' performance and reported increases in appropriate ball movement from baseline to intervention for all participants. Another football-related goal setting investigation by Maitland and Gervis (2010) explored its effectiveness in relation to the role of coaches. They utilised 10 elite football players and found that coaches influenced the players' goals. Maitland and Gervis (2010) also reported that players generally found lack of support from coaches in goal setting process; however, players sought out the coaches' input to align their goals to the coaches. Players understood the powerful role that the coaches played in determining their future football playing career and, therefore, recognised the need to match their goals with their coaches' as reassurance for their football future aspirations (Maitland & Gervis, 2010). Goal setting seemed to be influenced by players' evaluative standards associated with their beliefs and self-reactions.

Goal setting is a new concept for most young athletes, and coaches will need to guide them through the process and educate them of its usefulness. The process of goal setting has shown that many of the young athletes did not use the formal methods, as suggested by psychologists, of setting written goals and checking with the SMART criteria and were satisfied at retaining their goals in their head (Maitland & Gervis, 2010). SMART is a goal setting acronym that stands for goals being Specific, Measurable, Attainable, Relevant and Timely (Maitland & Gervis, 2010). Stratton (2005) encouraged provisions to be made for athletes so that they can learn the goal setting process to enhance motivation, develop new skills and strategies to improve performance, and focus attention to accomplish tasks.

Measuring Use of Mental Skills

The mental skills training approach has generated extensive interest among athletes and coaches, but concern remains about their overall effectiveness (Holliday et al., 2008; Gould, Medberry, Damarjian, & Lauer, 1999). Some common problems identified by athletes and coaches included: overcoming athlete reluctance in participating in intervention, gaining athletes' trust, ensuring athletes practice mental skills, lack of consultant knowledge about specific sports, maintaining consistent athletes' contact throughout the season, and getting complete cooperation from coaching and organisation staff (Weinberg et al., 2011).

To overcome these identified obstacles, it is important to measure the mental skills and strategies used by athletes in competition and in practice, which will also help plan and implement a robust mental skills training program. The Test of Performance Strategies (TOPS; Thomas et al., 1999) has been developed to assess the use of mental skills strategies by athletes. It is a popular instrument in sport psychology (Hardy et al., 2010) and has been accepted as a useful tool for profiling athletes' strengths and weaknesses, as well as for assessing the benefits of targeted interventions (Frey et al., 2003).

Even though TOPS is widely used by researchers, it was found to be lacking good psychometric properties and questions have remained regarding aspects of its factorial validity, in addition to its use with adolescent athletes (Lane, Harwood, Terry, & Karageorghis, 2004). The issues identified by Lane and colleagues (2004) included problems with activation, emotional control, and negative thinking for the competition inventory, and with activation and automaticity for the practice inventory. They concluded that a large number of items had excellent loadings (84%), while some showed weak loadings. Lane and colleagues' review encouraged Hardy and colleagues (2010) to refine the original TOPS and develop a stronger TOPS 2 instrument. The TOPS 2, therefore, was a revision of the TOPS and addressed some of the concerns by providing a comprehensive measure of psychological skills, techniques, and strategies used by athletes in competition and practice (Hardy et al., 2010). The summary of the psychometrics of published support for the TOPS 2 is presented in Chapter 4.

While the TOPS 2 showed some psychometric advancement from the original scale, it still had some practical concerns. In particular, the current revised 68-item TOPS 2 questionnaire might be too long when implemented in conjunction with other questionnaires in the context of typical studies where time availability is limited (Marsh, Martin, & Jackson, 2010; Marsh, Ellis, Parada, Richards, & Heubeck, 2005). This was of particular concern in the current research, which used a relatively extensive test battery in the context of a longitudinal research protocol. Therefore, a shorter version of the TOPS 2 was essential to the current research. This was also likely to be of benefit to applied research more generally.

Development of the TOPS Short Form

The psychometric properties of the TOPS 2 were examined by Hardy and colleagues (2010) when they refined the original TOPS (Thomas et al., 1999) questionnaire. Overall the TOPS 2 has strong psychometric properties and can be used as a research tool to examine research questions and predict important training and competition behaviours (Hardy et al., 2010). A detailed literature on the TOPS 2 is presented in the relevant Chapter 4.

For the current investigation, a shorter version was more appropriate in order to reduce the administration time to something more manageable. However, it needed to remain true to the constructs of the long form and measure them reliably (Marsh et al., 2005; Smith & McCarthy, 1995; Smith, McCarthy, & Anderson, 2000). Marsh and colleagues (2010) proposed a set of guidelines for the evaluation of short forms of existing psychological instruments, and this provided a starting point for the evaluation of the TOPS 2 short form (further detail is in Study 2, Chapter 4).

Intervention Direction

Researchers are now calling for psychological skills to be incorporated into the sport training program due to the significant benefits of these programs in athletes’ performance, as well as other areas of their lives (Forneris et al., 2007; Larsen et al., 2012). However, there are many challenges faced when implementing life skills programs, such as lack of resources, knowledge, and conflicting goals of all stakeholders (Camire et al., 2013). It can become very difficult to convince coaches and sport organisations to incorporate a separate life skills program into the normal sport training without stating the usefulness of the program for athletes' sport performance and the expected competition outcome. Also, most times it is assumed that athletes may already possess the mental skills needed for success in sports. Vealey (2007) countered this assumption and stated that athletes often need to be systematically taught mental skills so that they can perform under increasing competitive pressure and also gain valuable life skills required to manage the demands of the sport.

Coaches, athletes, and other stakeholders may be more accepting of a structured psychological skills holistic program that will primarily focus on performance enhancement to achieve a more positive competition outcome for their athletes or teams, while also providing additional benefits for other desirable psychological strengths, such as life effectiveness. An interactive, athlete-centred, needs-based intervention program would be more appealing to athletes and there is greater probability of its employability.

The current intervention research supported the call for a mental skills training program to be integrated into a sports training program that enhances sports performance and also psychological strengths, such as life effectiveness, which can positively influence athletes' other life domains (e.g., school, home, social life). These interesting conceptualizations discussed above are encouraging, and therefore showed a need to further explore the use of mental skills and the effects of a psychological strength training program on athletes' performance. The valuable information gathered through this research will be provided in Study 3, and provides the coaches necessary information to further develop their athletes.

CHAPTER 3

Effects of Mental Skills Training on Sports Performance: A Meta-Analysis

Introduction

The effectiveness of mental skills training on sports performance has been discussed in detail in the mental skills review section in the Literature Review in Chapter 2. Brief literature on the association between mental skills training and sports performance, more specific to meta-analysis, is presented here. Meta-analyses by Feltz and Landers (1983) and Driskell and colleagues (1994) are dated studies but are widely referenced due to their relevance to the current meta-analysis.

Background

Gardner and Moore (2006) have taken a more cautious approach in their interpretation of the effect sizes and the quality of findings on the effects of the use of mental strategies on sports performance. They maintained that numerous studies that may project favourable effect sizes for use of mental strategies on sports performances were inconclusive, and the authors also voiced concerns about the poor methodological features used with mental skills intervention research studies. Gardner and Moore (2006) also argued that only randomised control between-group designs and single-case designs with intervention comparisons show empirical support and were eligible for their criteria of well-established intervention studies. They explored the five most widely used mental strategies by practitioners (i.e., goal setting, imagery, self-talk, relaxation, and multicomponent).

They, however, agreed that research designs that do not use randomised control trials (RCT) can show intervention efficacy, but that these may not be considered best for intervention evaluation (Gardner & Moore, 2006). Gardner and Moore’s views indicated that the majority of the studies that examined the outcome of mental skills training may not meet the criteria for empirically supported interventions, but inclusion in the meta-analysis can give a fair indication of the use and effectiveness of mental strategies in sports performance. Limiting meta-analyses with only well-established RCTs may produce a smaller pool of studies, thus producing a distorted mental practice effect (Feltz & Landers, 1983). Abrami, Cohen, and d'Apollonia (1988) recommended a position intermediate between broad inclusion criteria of weighing varying qualities of studies and those relying exclusively on significance tests, such as RCTs.

Therefore, in order to collect comprehensive data and potentially effective intervention results, it is necessary to include a wider range of research studies; however, caution must be exercised when interpreting these results. Combining studies that are exploring different interventions may lead to misleading conclusions (Moore, 2012). Moore (2012) advised that researchers need to address the question of whether studies are comparing similar problems. Indeed, a critical feature of meta-analysis is to determine whether effect sizes (ESs) vary systematically as a function of different study designs and quality, and to examine potential biases if there are differences.

Numerous meta-analyses (Driskell et al., 1994; Feltz & Landers, 1983; Hatzigeorgiadis et al., 2011; Hinshaw, 1991), intervention studies (Afrouzeh et al., 2015; Coelho et al., 2012; Etnier & Landers, 1996; Mullen, Faull, Jones, & Kingston, 2015), and reviews (Gardner & Moore, 2006) have shown improved sports performance when athletes employed mental strategies. For example, intervention studies on goal setting (Mullen et al., 2015), imagery (Kalicinski, Kempe, & Bock, 2015), self-talk (Barwood, Corbett, Wagstaff, McVeigh, & Thelwell, 2015), relaxation (Hashim, Hanafi, & Yusof, 2011), and multicomponent strategies (Horn et al., 2011) reported improvement in sports performance as a result of exposure to mental strategies.

Recently, Brown and Fletcher's (2017) meta-analysis indicated that sport performance improved as a result of psychological and psychosocial interventions. This meta-analysis differs from Brown and Fletcher (2017) as the inclusion criteria had studies encompassing all intervention studies including, randomised control trials, quasi-experimental, single-subject multiple baseline, and other experiment treatments with pre- and post-test data compared to only randomised control designs included in their study. Furthermore, Brown and Fletcher (2017) evaluated the effects of an intervention that involved any action or process that used individual thought and behaviour (including the four mental skills considered for this meta-analysis), social factors (e.g., teambuilding), or both individual thought and behaviour and social factors (e.g., coach providing performance feedback) to alter functioning and/or performance whereas this meta-analysis only focused on the four predominant mental skills (goal setting, self-talk, imagery and relaxation as the independent variables). From the above information it could be deduced that this meta-analysis differs with Brown and Fletcher to some degree and at the same time extends their work in areas of the effects of the four predominant mental skills on sports performance.

Mental Practice

A meta-analytic review by Feltz and Landers (1983) yielded overall moderate, positive effect sizes (d = 0.48) and provided further evidence of mental practice facilitating better sports performance. Feltz and Landers's (1983) meta-analysis deduced that a number of dependent variables, such as cognitive, motor, and strength tasks, moderated the effects of mental practice. They compared the effects of mental practice on these tasks and found that cognitive tasks had larger (d = 1.44) in comparison to motor (d = 0.43) and strength tasks (d = 0.20).

There are two different approaches to defining mental practice. Some studies (Driskell et al., 1994; Etnier & Landers, 1996; Hinshaw, 1991) have primarily employed mental practice as visualization or imagery, while others (Austin & Miller, 1992; Wilkes & Summers, 1984) have a broader representation of mental practice and include any type of mental preparation. The broader term encapsulates mental practice as an umbrella term that refers to practicing through psychological means rather than physical and includes strategies such as imagery, psyching up strategies, attention to focusing strategies, relaxation, self-talk, and other forms of cognitive preparation (Cirimele, 2010; Guerra et al., 2018), and this term is adopted for the current meta-analysis. The common attribute to these exemplars is the inclusion of mental imagery that viewed mental practice as concerned with its effects on the learning and performance of motor skills. The distinguishing features are the other possible cognitive skills or strategies in defining mental practice which constitutes that imagery influences athletic performance through its effect on other psychological states, such as self-efficacy or confidence, motivation, and anxiety (Gould, Voelker, Damarjian, & Greenleaf, 2014). Kosslyn and Ochsner (1994) stated that mental imagery is a cognitive phenomenon which performs significant tasks, including recollection and innovative thinking.

Mental practice allows athletes to accommodate the rehearsed behaviours and codes them to be easily remembered and recalled enhancing performance (Driskell et al., 1994). Etnier and Landers (1996) surmised that mental practice leads to a more effortful cognitive processing that enables athletes to recall the rehearsed skill from memory. The authors found that mental practice was more beneficial in enhancing sport performance than physically practicing alone.

Although mental skills training has generated tremendous interest, there are some concerns about its level of effectiveness in optimising athlete development and performance (Holliday et al., 2008). Some interventions require athletes to mentally practice each skill session for a certain length of time, while others require athletes to practice the same skills for over a certain period of time (Feltz & Landers, 1983). Numerous researchers (Etnier & Landers, 1996; Feltz & Landers, 1983; Hinshaw, 1991) acknowledged that variations of mental practice have different effects on sports performance, and, therefore, it is essential to explore such an important factor.

Duration of mental practice. A meta-analysis by Hinshaw (1991) found that less than one minute or between a 15- and 25-minute duration of mental practice produced larger effect sizes than mental practice sessions between three to five minutes. Similar results were obtained by Etnier & Landers's (1996) investigation in which they found that athletes receiving one- or three-minute mental practice performed better than those receiving five to seven minutes of the mental practice.

Driskell and colleagues' (1994) meta-analysis found interesting results showing that long duration mental practice had a negative effect on sports performance. However, their results indicated overall beneficial mental practice effects on performance, and they recommended a mental practice of approximately 20 minutes for positive performance results. Feltz and Landers (1983) also examined the effect of the number of practice trials on the magnitude of effect sizes and found a significant relationship with sports performance. They found that studies showing less than six trials or between 36 and 46 trials per practice obtained the largest effect sizes.

Investigation of procedural variants of mental practice (such as duration of the mental practice and number of trials) is of practical importance and can extend the work of previous researches (Lutz et al., 2001). The duration of mental skills practice is a potential moderator (Driskell et al., 1994; Feltz & Landers, 1983; Lutz et al., 2001), and in this meta-analysis, we investigated the procedural variants of mental practice in relation to the five common mental strategies (i.e., goal setting, self-talk, imagery, relaxation, and multicomponent).

Summary of previous meta-analyses. Previous meta-analyses discussed above showed that mental skills training have significant positive associations with an improvement in sports performance. Duration of mental practice was a significant moderator variable;

however, this was only explored for studies with mental imagery. This meta-analysis extended the work on these reviews and presented effect sizes for the four most widely used mental skills and the multicomponent strategy (literature related to this was presented in Chapter 2). It also further investigated the potential moderator effect that study characteristics had on the effect sizes.

The Current Research

The purpose of the present study was to systematically review and conduct a meta-analysis of evidence on common mental strategies used to enhance sports performance. This study further investigated variants of mental practice, such as duration of the intervention program, length of mental strategies used, and the number of trials implemented during the intervention program. In particular, this meta-analysis examined whether the 20-year-old findings of three minutes and less mental practice for the most gain in performance (Etnier & Landers, 1996; Hinshaw, 1991) was still applicable today. Other moderating variables, such as mental skills, research design, age, gender, participants, type of sports, and risk of bias, were also of importance, as they could provide researchers information on inconsistencies in the magnitude of effect sizes across these studies (Lutz et al., 2001).

The current study extended the work of Gardner and Moore (2006). However, unlike their investigation, this review selected a wider range of studies to explore the trend of mental skills training in enhancing athletic performance. To achieve this objective, the current research followed the Feltz and colleagues (1983) study and incorporated selection criteria that captured most research designs, which implemented an intervention that allowed comparison either through pre-test scores or with a control group, regardless of the methodology or quality. The current research also included further criteria to increase the quality of the investigation (see Method section). Three research hypotheses were explored.

Statement of Hypotheses

Hypothesis 1.1. A structured mental skills training program will enhance sport performance.

Hypothesis 1.2. The combined mental skills package will have a greater positive effect on sport performance compared to single skill interventions.

Hypothesis 1.3. Shorter duration (intervention length, length of mental practice, and number of trials) mental practice will have a greater positive effect on sport performance compared to long duration mental practice (see earlier discussion).

Method

The meta-analysis adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, & Altman, 2010). Moher and colleagues (2010) recommended a systematic and explicit method (PRISMA), which was used to identify, select, and critically appraise appropriate studies for selection and statistical analysis. PICO-based search strategy was adopted for a systematic literature review. PICO stands for Patient (problem), Intervention, Comparison, and Outcome (Schardt, Adams, Owens, Keitz, & Fontelo (2007). This meta-analysis was not registered.

Objective

To determine if the implementation of mental skills training program will promote the use of these skills and to determine if the multiple intervention is better than single intervention in enhancing sports performance.

Inclusion Criteria

Peer-reviewed empirical research studies published since 1980 that focused on mental skills intervention (i.e., goal setting, self-talk, relaxation, imagery and multicomponent skills) for either directly or indirectly enhancing sports performance were included in the current study. The multicomponent category was operationalized as having at least one of the four skills mentioned in the above selection process combined with any other skill/skills. The studies were obtained regardless of the population, whether competitive or non-competitive participants. Therefore, it included studies that: (a) had female or male participants who were either volunteers, elite, or sub-elite athletes between the ages of 10 and 40 (the youth category was chosen to align this meta-analysis to the intervention study presented in Chapter 5); (b) were sports context and not just physical education studies; (c) had either randomised control trials, quasi-experimental, single-subject multiple baseline, and other experiment treatments with pre- and post-test data; and (d) were full text in the English language.

Database Search and Selection of Studies

Electronic searches of seven databases (PubMed, EMBASE, SportDiscus, Psych INFO, Medline, Psych Articles and Scopus) were conducted on the 21st of February 2016 and all articles retrieved were reviewed. Ten additional studies were included from reviewing the reference list of the original retrieved studies.

Search Terms Strategy

The review team formulated these search terms with synonyms:

(("psychological skill*" OR "mental skill*") AND (sport* OR athlet* OR player*) AND (student* OR college OR undergraduate* OR adolescent* OR "young adult*" OR youth* OR teenager*))

("goal setting" AND (sport* OR athlet* OR player*) AND (student* OR college OR undergraduate* OR adolescent* OR "young adult*" OR youth* OR teenager*))

(Imagery OR Visuali*) AND (sport* OR athlet* OR player*) AND (student* OR college OR undergraduate* OR adolescent* OR "young adult*" OR youth* OR teenager*) ("self-talk" OR verbal*) AND (sport* OR athlet* OR player*) AND (student* OR college OR undergraduate* OR adolescent* OR "young adult*" OR youth* OR teenager*)

((Relaxation OR arousal) AND (sport* OR athlet* OR player*) AND (student* OR college OR undergraduate* OR adolescent* OR "young adult*" OR youth* OR teenager*)).”

Study Selection

Search results were exported into the Endnote reference manager software and duplicate records were deleted. At this point, 10 articles obtained through other sources were included in the Endnote reference manager. The search resulted in a large number of articles with 4,797 potential articles for inclusion. The main researcher (VK) screened all the records for titles and abstracts while two other researchers (JD and DV) each reviewed half of the set of records. Each record was, therefore, screened in duplicate.

The three researchers screened the abstracts, which resulted in removing 4,596 articles that clearly did not meet the eligibility criteria and retaining 201 studies. Full-text of the remaining 201 articles were retrieved and screened for eligibility. The main researcher again screened all the full-text articles while JD and DV each screened half of the set. The researchers crosschecked throughout the search and the screening process (i.e., search results, title and abstract screening, and full text screening), and any discrepancies regarding the selection and eligibility of the articles were resolved through consensus between the three researchers.

Data Extraction

The lead researcher extracted data from each article. Two other researchers (JL and DA) crosschecked the data extraction. The researchers crosschecked each half of the set of articles. The discrepancies and any changes were discussed and agreed upon after reviewing the extracted data. Data items included research design characteristics, sample sizes, gender, intervention delivery, age, participant description, country in which the study was set, sport and sport category, independent variable category, dependent variable category, pre-test and post-test means, pre-test and post-test standard deviations, *F* value and appropriate degrees of freedom, *t*-value and its degrees of freedom, and Cohen's *d* effect sizes.

Coding

Several studies included more than one intervention component, as well as multiple intervention groups and some measured multiple outcomes. The coding variables related to methodology (e.g., study design and sport types), programmatic features (e.g., intervention type, type of outcome measures), theory (e.g., physiological or psychological) and participant characteristics (e.g., age, gender, participant category [athletes, students or volunteers]). Two researchers (VK and JD) conducted the coding process, with the third researcher (DV) involved in this process for arising discrepancies.

Computation of Effect Sizes

Cohen's *d* was calculated by first obtaining the difference between the mean change for treatment and control groups and dividing that by a pooled (common) standard deviation (Borenstein & Wiley, 2009; Morris, 2008; Rosenthal, 1991, 1994). Appendix A displays summary formulas of effect sizes computed for Cohen's *d*. The effect sizes were defined as 0.2, 0.5, and 0.8 for small, medium, and large, respectively (Cohen, 1988; Liu, 2013). Cohen's *d* has a slight bias due to the absolute value of the effect size parameter in small samples, and this can be removed by Hedges' bias correction factor (Borenstein & Wiley, 2009; Card, 2015; Oppermann, 2013). The unbiased Cohen's *d* was obtained by multiplying the biased Cohen's *d* with the Hedges correction factor (Borenstein & Wiley, 2009; Morris, 2008). Unbiased variance was also obtained by multiplying biased variance by squared bias correction factor (Borenstein & Wiley, 2009; Card, 2015). See Appendix, A for all the formulas used for calculation in this meta-analysis.

Risk of Bias in Individual Studies

A bias is a systematic error, which can lead to underestimation or overestimation of a true intervention effect (Higgins & Altman, 2008). Cochrane Risk of Bias assessment was adopted for this meta-analysis, as it has greater validity than scale and checklist methods of bias measure (Higgins & Altman, 2008). The Cochrane Risk of Bias is a domain-based evaluation where these six factors are considered in assessing the risk of bias of results: (a) sequence generation, (b) allocation concealment, (c) blinding of participants and personnel, (d) incomplete outcome data, (e) selective reporting, and (f) other sources of bias (Higgins & Altman, 2008). For each of these factors, the main researcher independently completed the risk of bias for all studies while two other researchers (MN and DV) independently completed the risk of bias for each half of all the studies. Discrepancies arising were resolved between the two researchers, with consultation with a third researcher when needed. For each of the six factors, moderator analysis was conducted to examine whether potential risks of bias were moderators of the pooled effect sizes.

Risk of Bias Across Studies

As recommended by the Cochrane Handbook, funnel plots were created and explored to assess for publication and risk of bias across studies (Sterne, Egger, & Moher, 2008). A symmetrical inverted funnel will indicate the absence of bias (Owen et al., 2016). The prevalence of smaller studies with larger effects would show the presence of publication bias (Lonsdale et al., 2013).

Analysis

Fixed-effects and random-effects models are the two traditional approaches to meta-analysis (Field, 2003; Marsh, Bornmann, Mutz, Daniel, & Mara, 2009; O'Mara, Marsh, Craven, & Debus, 2006). Fixed-effects models make untenable assumptions that there is one true, population effect size being estimated (Cohn & Becker, 2003; Hunter & Schmidt, 2000; Marsh et al., 2009; Owen et al., 2016). In other words, effect size in a population is homogeneous and assumed to be same for all studies (Field, 2003). Researchers have argued for random-effects models in which variability reflects sampling error and also features of studies contribute to variability in effect sizes (Marsh et al., 2009).

However, researchers (Cheung, 2014; Konstantopoulos, 2011; Marsh et al., 2009; Moeyaert et al., 2017; Van den Noortgate, López-López, Marín-Martínez, & Sánchez-Meca, 2013; Van Den Noortgate & Onghena, 2003) have advocated for multilevel approaches to managing multiple outcomes. Indeed, conventional meta-analytic strategies (i.e., the fixed-effects model or two-level random-effects model; Raudenbush, 2009) are limited by the assumption of independence (Field, 2003). This means that only one effect size per study is considered, but multiple effect sizes within a single study are likely to be correlated.

Common methods, such as averaging effect sizes or selecting one of the effect sizes, have the potential to lose the information on differences between effect sizes within a single study. This leads not only to lower statistical power, but also to a limitation in research questions that can be addressed, because the influence of sampling differences, designs, and methods cannot be investigated properly (Cheung, 2014). In this case, multi-level Structural Equation Modelling (SEM) was used.

The current study adopted a SEM-based approach to the three-level random-effects models. In a three-level random-effects model, three sources of variance are modelled: (a) variation in effect sizes due to random sampling of effect sizes (Level 1); (b) variation in effect sizes due to differences within a single study (Level 2); and (c) variation in effect sizes between different studies (Level 3). Integrating multilevel meta-analysis into structural equation modelling unifies the model to provide various techniques into a single framework (Cheung, 2014). Some advantages are that it uses full information maximum likelihood to handle missing data, places flexible constraints on parameters, and uses a likelihood-based approach to construct more accurate confidence intervals (Cheung, 2009, 2014; Owen et al., 2016). All analyses were conducted in R Version 3.1.2 (R Core Team, 2014). The meta SEM package was used for meta-analysis (Cheung, 2014).

Moderator variables were included to explore the heterogeneity in effect sizes. Heterogeneity was measured using I^2 rather than the Q statistic. For a comprehensive test of heterogeneity, the Q statistic has low power when there is small number of studies (Gavaghan, Moore, & McQuay, 2000), and may also have too much power when the number of studies is large (Higgins, Thompson, Deeks, & Altman, 2003). The I^2 statistic was developed to give a better measure of the consistency between trials in a meta-analysis (Higgins et al., 2003). The use of subgroup analysis to explore heterogeneity was recommended such that each subgroup should have a minimum of four studies (Fu et al., 2011). This approach was adopted for the current study, and for each moderator variable heterogeneity between effect sizes was calculated in each category (I^2). See Table 2 for moderators included in this study.

Results

Study Selection

The PRISMA flow diagram (Figure 1) presented below illustrates the review process. A total of 201full-text studies was assessed and 127 met the inclusion criteria for the final analysis. Seventy-four full-text studies were rejected because several studies had inadequate data, such as no mean, no standard deviation or *t*-test, or no basis for computing effect sizes. Attempts were made to obtain further information from the authors of these articles via email correspondence but were mostly unsuccessful. A large number of authors did not respond to my requests, and two said that they destroyed the data since the study was old. See Figure 1 for further details. Full meta-analysis reference list is presented in Appendix C

Study Characteristics

Study characteristics are detailed in Table 1. Over 70 percent of the studies were conducted in United States (*k* = 57), United Kingdom (*k* = 26), Greece (*k* = 12), and Canada (*k* = 7), while the others were spread across other 17 countries. All the studies implemented an intervention, with 73 employing randomized control trials, 46 studies using pre-test post-test, and eight studies using quasi-experimental designs. Studies came from a wide variety of sports and demographics, with 6,440 participants ranging from seven to 39 years old included for this analysis. The older age group of 39 also came up with our search criteria, and due to its relevance to this meta-analysis, was included in the study.

Most studies included participants from the high school or university level. Gardner and Moore (2006) argued that analogue studies do not reflect empirical support for athletic performance enhancement interventions. However, here, studies utilising subjects with a range of athletic experience from beginner to elite athletes were included to reflect the mental skills use trend across the research. There were 39% athletes and 61% volunteers/student participants across these studies.

Several studies compared more than one intervention, thus allowing for multiple independent variables and multiple comparisons. A total of 154 interventions were evident from 127 studies reviewed. Among the mental skill strategies, imagery had been studied most (*k* = 52), followed by goal setting (*k* = 28), self-talk (*k* = 24), and relaxation (*k* = 12). Further, 38 studies examined more than one strategy at the same time. Several studies also had multiple dependent variables for each intervention.

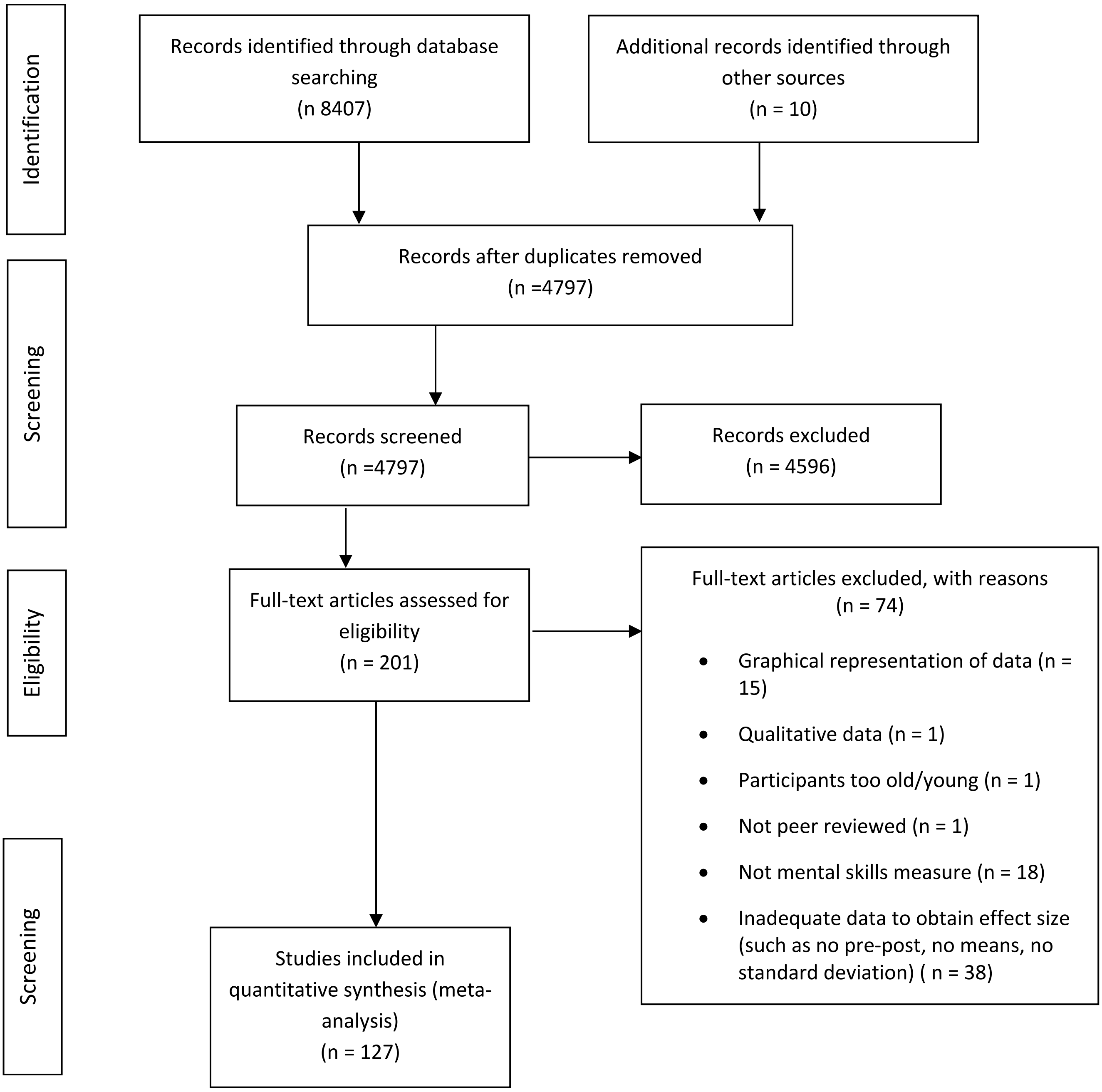

Figure 1. Flow diagram of search result.

Table 1

Characteristics of Included Empirical Studies

Study	Overall risk of Bias	Research Design	Intervention type	Trials	Training length	Program Duration (days)	Outcome	Subjects male/ female	Age range	Sample description	Sport	Country
Afrouzeh et al. (2015)	?	RCT	Imagery, Combination of imagery & relaxation	3	15min	49	Strength	36/0	13-14	Volleyball players	Volleyball	Iran
Amal & Nagla (2011)	-	RCT	Combination of relaxation & self-talk	16	50min	84	Cognition	0/40	17-19	Physical Education students	Karate	Egypt
Anderson et al. (1988)	-	PP	Goal setting	NS	NS	730	Strength	17/0	18-22	Athletes	Hockey	USA
Annesi (1997)	-	PP	Goal setting	15	NS	70	Strength	16//2	13-17	Junior players	Tennis	USA
Bar-Eli & Blumenstein (2004)	+	RCT	Imagery	14	40min	70	Strength	40	16-18	Pre-elite swimmers	Swimming/ running	Israel
Bar-Eli et al. (2002)	-	RCT	Imagery	102	40min	98	Strength	31//7	12--14	Swimmers	Swimming	Israel
Barwood et al. (2015)	-	PP	Self- talk	4	60min	10	Strength	14/0	18-20	Volunteers	Time-trial cycling	UK
Barwood et al. (2008)	-	Q	Combination of imagery & relaxation, goal setting & self-talk	1	60min	4	Strength	18/0	20-33	Volunteers	Running	UK

Battagilia et al. (2014)	-	RCT	Imagery	12	3hrs	42	Strength	0/72	12--16	Gymnastics	Gymnastics	Italy
Bell et al. (2013)	-	PP	Combination of Imagery, self-talk & relaxation	46	46days	730	Cognitive, Strength	41/0	16-18	Elite youth cricketers	Cricketers	UK
Blair at al. (1993)	-	RCT	Imagery	12	15min	42	Motor Strength	0/44	18-28	Soccer players	Soccer	Canada
Blakeslee & Goff (2007)	-	Q	Combination of Imagery, self-talk, goal setting & relaxation	4	2.5hr	28	Motor Cognitive	0/17	18-25	Horseback riders	Equestrians	USA
Boyce et al. (2001)	+	RCT	Goal setting	60	NS	105	Motor	156	18-33	College students	Tennis	USA
Brewer & Shillinglaw (1992)	-	RCT	Goal setting, self-talk, relaxation, imagery and combination of all 4	2	40min	28	Cognitive	49/0	Unknown	NCAA college players	Lacrosse	USA
Burhans et al. (1988)	-	RCT	Imagery	3	10min	84	Strength	36/29	17-22	Physical conditioning university students	Running	USA
Burton, D (1989)	-	PP	Goal setting	13	NS	56	Strength	16//07	18-24	Physical education undergraduates	Basketball	USA

Callow et al. (2001)	-	PP	Imagery	-	NS	147	Motor	3/1	14-16	Junior players	Badminton	UK
Carter & Kelly (1997)	-	RCT	Imagery	1	3min	1	Motor, Cognitive	43/60	18-21	Basketballers	Basketball	USA
Chang et al. (2014)	-	PP	Self-talk	3	4min	70	Motor	31//11	16-18	Senior high students	Softball	Taiwan
Coelho et al. (2007)	-	Q	Combination of imagery & relaxation	24	25min	56	Motor,	48/0	16-18	Tennis players	Tennis	Brazil
Coelho et al. (2012)	-	Q	Combination of imagery & relaxation	27	25min	63	Cognitive	64/0	16-18	Elite tennis players	Tennis	Brazil
Coker et al. (2015)	-	RCT	Imagery	10	NS	1	Strength	0/24	21-31	Dancers	Dancing	USA
DeRenne & Morgan (2013)	-	RCT	Imagery	84	70min	98	Strength Motor	0/13	19-21	College students	Softball	USA
Edwards et al. (2008)	-	PP	Self-talk	1	5min	2	Strength	24/0	17-25	Rugby players	Rugby	UK
Filby et al. (1999)	-	PP	Relaxation Goal setting	10	60min	35	Cognition, Strength	23/17	19-24	Students	Football	UK
Flegal & Anderson (2008)	-	RCT	Self-talk	1	NS	1	Strength Motor	34/6	Unknown	Undergraduate golfers	Golf	USA
Gapin & Herzog, 2014	-	Q	Imagery	NS	NS	1	Cognitive	22/44	19-22	College students	Sailing	USA
Getz & Rainy (2001)	-	RCT	Goal setting	5	NS	5	Motor	38/0	Mean age 19.3	Basketball players	Basketball	USA

Giannini et al. (1988)	-	PP	Goal setting	2	NS	1	Strength	100/0	Unknown	Physical Education students	Basketball	USA
Glynn et al. (2013)	-	PP	Self-talk, relaxation and a combination of self-talk, goal setting & imagery	24	12min	84	Cognition, Strength	39	19-27	College students	Swim	USA
Gordon et al. (1994)	-	RCT	Imagery	3	10min	6	Cognition, Motor	64/0	Unknown	High school students	Cricket	Australia
Goudas et al. (2006)	-	PP	Self-talk	4	NS	1	Strength	30/21	18-21	Athletes	Long Jump	Greece
Gray (1990)	-	RCT	Combination of-Imagery & relaxation	1	20 min	14	Strength	24/0	18-26	Racquetball students	Racquetball	USA
Greer & Engs (1986)	-	PP	Combination of Relaxation & hypnosis	NS	NS	28	Strength	90	Unknown	Tennis Univeristy students	Tennis	USA
Grouios (1992)	+	RCT	Imagery	10	30min	21	Strength	0/30	13-20	Teenage volunteer divers	Diving	Greece
Gucciardi et al. (2009a)	-	RCT	Combination of relaxation, imagery, attention control & psycho-education	6	2hrs	42	Cognition	24/0	U15s	Youth players	Football Aussie R	Australia
Guillot et al. (2013)	+	PP	Imagery	1	NS	7	Cognition, Strength	12//1	16-24	High jumpers	High jump	France

Guillot et al. (2010)	-	PP	Imagery	15	25min	35	Cognition	0/10	13-17	Synchronized swimmers	Swimming	France
Hall et al. (1983)	-	RCT	Combination of imagery & relaxation	5	30min	42	Strength	0/10	unknown	College basketball Players	Basketball	USA
Hall & Hardy (1991)	-	RCT	Combination of Imagery& relaxation	2	10 hr	42	Motor	15/15	18-23	University students	Pistol shooting	USA
Hall and Byrne (1988)	-	RCT	Goal setting	4	NS	21	Strength	43/11	Unknown	College students	Weight training	UK
Hammond et al. (2012)	-	PP	Imagery	6	15min	18	Strength	3/0	18-20	College golfers	Golf	Canada
Hardy & Callow (1999)	+	RCT	Imagery	6	60min	1	Motor	20/20	18-35	Physical Education students	Gymnastics	UK
Hashim et al. (2011)	-	RCT	Relaxation and combination of imagery & relaxation,	12	30min	28	Cognitive Strength	16/0	12--15	Athletes	Soccer	Malaysia
Hatzigeorgiadis et al. (2004)	-	RCT	Self-talk	1	NS	1	Cognitive Strength	30/30	19-22	Volunteers	Water-Polo	Greece
Hatzigeorgiadis et al. (2007)	-	PP	Self-talk	2	50min	5	Cognitive Strength	0/21	19-22	Swim students	Water-Polo	Greece
Hecker & Kaczor (1988)	-	PP	Imagery	1	6min	1	Cognitive Strength	19	unknown	NCAA div 1 players	Softball	USA
Heiland & Rovetti (2013)	-	Q	Imagery	8	NS	10	Strength	2//11	18-29	College dancers	Dance	USA
Heiland et al. (2012)	-	PP	Imagery	7	NS	42	Strength	0/18	unknown	College Dancers	Dance	USA

Holm et al. (1996)	-	Q	Combination of relaxation & imagery	14	2hrs	49	Cognitive Strength	26/36	unknown	Athletes	Football/ swimming	USA
Horn et al. (2011)	-	PP	Combination of goal setting, relaxation, imagery & self-talk	20	50min	70	Cognitive	0/19	18-21	College players	Softball	USA
Hughes (1990)	-	PP	Imagery, goalsetting and combination of imagery and goal setting	10	NS	10	Cognitive	27/0	gr- 9--12	High school students	Football	USA
Jeon et al. (2014)	-	RCT	Combination of relaxation, imagery	4	8min	1	Motor	36/0	19-27	College students	Badminton	Korea
Johnson et al. (1997)	+	RCT	Goal setting	5	NS	35	Motor	36/0		university students	Bowling	USA
Kim & Tennant (1993)	-	RCT	Imagery	5	10min	1	Motor	28/20	18-34	College students	Shooting	USA
Kingsley et al. (2013)	+	RCT	Imagery	3	15 min	1	Motor	9//4	19-23	Cyclists	Cycling	USA
Lamirand & Rainey (1994)	-	PP	Combination of imagery, relaxation	2	5min	21	Motor	0/18	Mean age 19.2	NCAA div III players	Basketball	USA
Landin & Hebert (1999)	-	PP	Self-talk	2	NS	6	Cognitive Strength	0/5	18-21	Players	Tennis	USA
Lane & Streeter (2003)	-	RCT	Goal setting	1	NS	21	Motor	72/0	14-17	Players	Basketball	UK

Lanning & Hisanga (1983)	?	RCT	Relaxation	1	30min	35	Cognitive Motor	0/24	14-18	Volleyball players	Volleyball	USA
Lerner & Locke (1995)	-	RCT	Goal setting	3	NS	1	Cognitive	60/0	Mean age-20.4	Undergraduates	Endurance task	USA
Lerner et al. (1996)	-	RCT	Goal setting, imagery, and combination of goal setting & imagery	10	15min	20	Motor	0/12	Mean age-19.3	College students	Basketball	USA
Lohr & Scogin (1998)	-	PP	Combination of Imagery & relaxation	18	54min	18	Strength	17/19	18-23	College athletes	Athletes	USA
Louis et al. (2012)	-	PP	Imagery	3	7min	1	Cognitive Strength Motor	17/20	13-26	Horse riders	Equestrian	France
Lutz (2001)	-	RCT	Imagery	NS	7min	1	Motor	120	Unknown	Golfers	Golf	USA
Masciana et al. (2001)	-	RCT	Self-talk, imagery	5	NS	6	Motor	15/15	28-38	Undergraduates	Dart	USA
Mashayekh et al. (2014)	-	Q	Imagery	56	NS	56	Cognitive	73/0	12--14	Soccer players	Soccer	Iran
Maynard & Cotton (1993)	-	PP	Relaxation	12	20min	42	Cognitive	20/0	19-22	Hockey players	Hockey	UK
Maynard et al. (1998)	-	PP	Relaxation and a combination of relaxation & imagery	6	20min	42	Cognitive	21/20	18-20	University students	Multi-sports	UK
McCarthy et al. (2010)	-	PP	Goal setting	1	40min	49	Cognitive	3/0	12--13	Athletes	Athletics	UK

Meacci & Pastore (1995)	-	RCT	Imagery	30	50min	70	Motor	52/28	17-23	College students	Golf	USA
Meacci & Price (1985)	-	PP	Combination of relaxation and imagery	30	6min	70	Motor	55/27	18-21	undergraduates	Golf	USA
Mellalieu et al. (2009)	-	PP	Imagery	1	6min	140	Cognitive	5/0	21-28	College students	Rugby union	UK
Miller & McAuley (1987)	?	RCT	Goal setting	5	50min	35	Cognitive	16//2	18-30	Undergraduates	Basketball	USA
Mooney & Mutrie (2000)	-	RCT	Goal setting	10	NS	1	Strength	29/17	8--15	Badminton students	Badminton	UK
Mousa et al. (2013)	-	RCT	Self-talk	3	60min	28	Cognitive Strength	30/0	18-21	Undergraduates	Swimming	Jordan
Mullen et al. (2015)	?	RCT	Goal setting	3	NS	3	Cognitive	24/0	17-21	Undergraduates	Car Racing	UK
Munroe-Chandler et al. (2012)	-	RCT	Imagery	3	15min	42	Motor Strength	75/68	7--14	Soccer players	Soccer	Canada
Munroe-Chandler et al. (2005)	-	PP	Imagery	1	15min	49	Cognitive	0/13	U13	Soccer players	Soccer	Canada
Murphy & Woolfolk (1987)	?	RCT	Combination of imagery, self-talk & relaxation	1	25min	1	Cognitive Motor	47/14		Undergraduates	Golf	USA
Nelson et al. (2008)	?	RCT	Imagery	12	NS	21	Motor	6/0	16-22	Student players	Baseball	USA
Olsson et al. (2008)	-	RCT	Imagery	12	6min	42	Motor Strength	13//11	16-19	Athletes	High jumpers	Sweden
Onestak (1997)	?	RCT	Combination of imagery & relaxation	3	6min	21	Motor	48/0	18-25	Athletes	Basketball	USA

Ortega et al. (2013)	-	PP	Goal setting	5	NS	35	Cognitive	8/0	U12	Basketballers	Basketball	Spain
Page et al. (1999)	-	RCT	Imagery	5	30min	35	Cognitive	0/40	18-22	College students	Swimming	USA
Papaioannou et al. (2004)	-	PP	Self-talk, goal setting and combination of self-talk and goal setting	14	NS	9	Motor	41/0	15-39	Football players	Football	Greece
Pargman & De Jesus (1987)	?	PP	Goal setting	NS	NS	2	Cognitive	60/0	16-18	High school students	Basketball	Puerto Rico
Peluso et al. (2005)	-	RCT	Self-talk, imagery	1	NS	1	Motor	41/109	19-25	College students	Golf	USA
Peynirciglu et al. (2000)	-	PP	Imagery, relaxation	1	NS	1	Motor Strength	60/60		Undergraduates	Basketball	USA
Pie et al. (1996)	-	RCT	Imagery	3	2min	35	Motor	44/31	16-17	High School students	Basketball	Israel
Rodgers et al. (1991)	-	RCT	Imagery, self-talk	36	15min	112	Cognitive Strength	29	13.7	Figure skaters	Figure skating	Canada
Sarafrazi et al. (2012)	-	PP	Imagery	1	2min	1	Motor	0/40	19-22	Athletes	Athletes	Iran
Savoy et al. (1996)	-	PP	Imagery	9	20min	42	Motor	0/10	18-21	Basketballers	Basketball	USA
Seabourne et al. (1984)	-	RCT	Combination of relaxation and imagery	3	10min	112	Cognitive Motor	18/26	18-24	Athletes	Karate	USA
Senecal et al. (2008)	-	RCT	Goal setting	2	30min	140	Cognitive	0/86	14-18	High school students	Basketball	Canada

Shambrook & Bull (1996)	-	RCT	Imagery	36	20min	84	Motor	0/4	19-22	Varsity level	Basketball	UK
Sheard & Golby (2006)	-	PP	Combination of goal setting, imagery, relaxation, concentration & thought stopping	5	45min	49	Cognitive Strength	13/23	10--18	National level swimmers	Swimming	UK
Shoenfelt & Griffith (2008)	-	PP	Combination of self, talk, goal setting, relaxation & attentional focus	3	60min	14	Cognitive	11	18-22	University players	Volleyball	USA
Short et al. (2002)	-	RCT	Imagery	1	NS	1	Cognitive	47/36	19-23	University students	Golf	USA
Smith & Holmes (2004)	?	RCT	Imagery	12	NS	42	Cognitive Strength	40/0	19-32	Amateur golfers	Golf	UK
Smith et al. (2001)	?	RCT	Imagery	1	NS	49	Motor	7--20	17-23	Undergraduates	Hockey	UK
Smith et al. (2007)	?	RCT	Imagery	1	5min	42	Strength Motor	24-24	17-24	Hockey players	Hockey	UK
Straub (1989)	-	PP	Combination of imagery, goal setting, relaxation & cognitive restructuring	1	30min	56	Motor	0/75	18-22	College students	Dart	USA
Swain & Jones (1995)	-	PP	Goal setting	8	NS	56	Motor	4/0	19-24	Elite players	Basketball	UK

Tahmasebi et al. (2014)	?	RCT	Self-talk	10	NS	84	Motor	0/72	19-21	Undergraduates	Basketball	Iran
Taylor & Shaw (2002)	-	RCT	Imagery	1	NS	1	Cognitive Motor	46/5	18-22	skilled and unskilled	Golf	UK
Tenenbaum et al. (1999)	-	RCT	Goal setting	4	NS	28	Strength	0/28	13-16	Middle distance school students	Running	Australia
Terry et al. (1995)	-	RCT	Relaxation, imagery and combination of relaxation and imagery	1	15min	1	Cognitive	42/58	12--15	Elite junior	Tennis	UK
Theodorakis (1995)	-	PP	Goal setting	4	NS	1	Cognitive	42	Unknown	University students	Swimming	Greece
Theodorakis (1996)	-	PP	Goal setting	4	NS	1	Cognitive	22/26	19-23	University students	Tennis	Greece
Theodorakis et al. (2001)	?	RCT	Self-talk, goal setting	2	NS	1	Motor Strength	60	18-22	Undergraduates	Basketball	Greece
Theodorakis et al. (2000)	?	PP	Self-talk	1	NS	1	Motor	60	18-33	PE students	Flexibility task	Greece
Tod et al. (2009)	?	PP	Self-talk	4	NS	5	Strength	12//12	17-24	sub-elite athletes	Vertical jump	UK
Van Gyn et al. (1990)	-	RCT	Imagery and a combination of imagery and power	3	6min	42	Strength	19/21	Unknown	Undergraduates	Power training	Canada
Van Raalte et al. (1995)	?	RCT	Self-talk	1	NS	1	Motor	60/0	18-22	Undergraduates	Dart	USA

Weina et al. (2012)	-	RCT	Goal setting	24	NS	56	Cognitive	0/60	10--15	Table tennis athletes	Table Tennis	China
Weinberg et al. (2012)	-	PP	Self-talk	1	3min	7	Strength	41/40	18-24	College cross country runners	Cross-country	USA
Weinberg et al. (1987)	-	RCT	Relaxation	16	10min	112	Motor Strength	42/0	Unknown	University students	Karate	USA
Weinberg et al. (1983)	-	RCT	Relaxation, imagery	1	NS	1	Motor	40/0	18-23	University students	Basketball	USA
Weinberg et al. (1981)	-	RCT	Relaxation, imagery and combination of imagery and relaxation	1	20min	42	Motor	32/0	18-24	University students	Karate	USA
White & Hardy (1996)	?	RCT	Combination of relaxation and imagery	1	NS	1	Cognitive Strength	17/0	Mean age - 13	Gymnasts	Gymnastic	UK
Williams et al. (2013)	?	RCT	Imagery	4	NS	1	Cognitive	12//12	19-22	Volunteers	Golf	UK
Woolfolk et al. (1985)	-	RCT	Imagery	1	NS	1	Motor	50/0	Unknown	College students	Golf	USA
Zervas & Kakkos 91995)	?	RCT	Combination of imagery & relaxation	2	NS	8	Motor	46/5	19-22	University students	Archery	Greece
Zimmerman & Kitsantas (1996)	-	RCT	Goal setting	1	12min	1	Cognitive Motor	0/50	14-16	High school students	Dart	USA
Zourbanos et al. (2013)	?	RCT	Self-Talk	3	NS	1	Strength	24/16	10--12	Physical Education students	Handball	Greece

Zourbanos et al. (2013)	?	RCT	Self-talk	5	NS	5	Strength	30/15	10-Dec	Elementary school students	Soccer	Greece

Notes: + = low risk of bias;? = unclear risk; − = high risk of bias; RCT = randomised control trials; min = minutes; NS = not stated; PP = pre-test-post-test; Q = quasi-experimental.

Consequently, there were 682 effect sizes for 127 studies. The multiple comparisons also showed a vast range of outcome variables. The outcome variables were coded according to participants' experience with the task. Hence, in line with Feltz and Landers (1983), these outcome variables were categorised into three groups: cognitive, motor, and strength tasks. It was beyond the scope of this study to include any other categories. Each outcome variable was identified for a closest fit into one of these groups for analysis purposes. Each outcome variable was identified for a closest fit into one of these groups for analysis purposes. The following section shows results for each intervention mental skill.

Imagery

Fifty-two studies were identified as using imagery intervention from 154. Of those, 27 studies included athletes as participants, while the other 25 had volunteers/students. A total of 238 ESs were from imagery intervention. Of these, 86 cognitive, 69 motor, and 83 strength-based task outcomes were evident. RCTs with 155 ESs were well represented, compared to pre-post (74) and quasi-experimental (9). Interventions with athletes (49) and those over 21 years old (123) were highly represented in their category. Also, individually based sports, with 155, were well represented, compared to team-based sports (83).

Goal Setting

Twenty-eight studies with goal setting intervention were obtained from 154 interventions. Eight of those studies had athletes as participants, while the other 20 had students and volunteers as participants. The 103 goal setting effect sizes showed 33 cognitive, 31 motor, and 39 strength-based task outcomes. Fifty-one studies were RCTs and 51 represented pre-post design. The 15-20-year-old age category (46) and volunteers/students (70) groups were highly represented participants compared to other age groups. The team sports, with 63 ESs, were higher than the individual sports (40) groups.

Self-talk

This analysis yielded 24 self-talk interventions. Of those, 10 studies had athletes as participants, while 14 studies had students/volunteers. The 99 self-talk effect sizes obtained from those studies resulted in 24 cognitive, 37 motor, and 38 strength-based task outcomes. Research design had slightly different numbers with RCT (54) and pre-post (45). Student/volunteer numbers, with 57 ESs, were higher than the athlete (42). The over 21 age group had the highest representation with 49 ESs. Individual sports (53) had higher representation than team sports (46).

Relaxation

Relaxation had the least number of studies with 12. Four out of the 12 studies had athletes and eight studies had students/volunteers as participants. Relaxation had the smallest number of ESs (48), with 27 cognitive, 18 motor, and three strength-based task outcomes. Of those, 34 had RCTs and 14 had pre-post research designs. Again, the over 21 age group (25) had higher representation than other age groups. The students/volunteers (29) were well represented compared to athletes (19). Team sports were higher (29) compared to individual sports (19).

Multicomponent

Thirty-eight studies were identified as using multicomponent. Of those, 21 studies included athletes as participants, while the other 17 had volunteers/students. A total of 194 ESs yielded for multicomponent and these showed 105 cognitive, 45 motor, and 44 strength-based task outcomes. RCTs (91) were higher than pre-post (71) and quasi-experimental (32) studies. Interventions with athletes (142) and over 21 years (68) were highly represented in their respective categories. Individually based sports (106) were well represented compared to team-based sports (88). See Table 2 for detailed results.

Table 2
Results of Mental Skills Training Meta-Analyses and Moderator Variables Analyses

Variable	*k*	*#ES*	*Cohen's (d)*	*Lower 95% CI*	*Upper 95% CI*	*R^2_3*	*I^2_2*	*I^2_3*
Overall mental skills	127	682	.72	.60	.85		.18	.70
Duration intervention length-Days						**.69**		
A1 < 1	26	142	.57	.42	.71		.22	.53
A 1-7	22	93	.55	.26	.83		.03	.81
B 8-21	14	49	.99	.01	1.98		.01	.96
C 22-42	30	199	.85	.63	1.05		.37	.47
D 43-70	19	106	.97	.51	1.44		.16	.79
E 70+	16	94	.76	.41	1.11		.14	.71
Intervention training length-Minutes						**.71**		
A 0-3min	4	17	1.37	.84	1.90		.08	.79
B 4-7min	12	69	.51	.38	.64		.53	.12
C 8-15min	8	53	.95	.53	1.37		.23	.69
D 15-25min	21	113	.79	.50	1.07		.11	.72
E 26-60min	26	137	.93	.62	1.23		.26	.64
F 61+ min	8	74	.57	.34	.80		.58	.20
NS	48	213	.70	.48	.91		.10	.77
Number of trials						**.71**		
A 1-3	58	279	.69	.55	.83		.28	.57
B 3-6	24	150	.64	.35	.92		.15	.73
C 7-12	18	125	.89	.18	1.59		.03	.92
D 13-24	12	74	1.10	.55	1.66		.19	.76
E 25-36	5	17	.79	.35	1.24		.50	.34
F 37+	6	32	.55	.44	.67		.00	.13
Outcome _D						**.00**		
Cognitive	49	275	.74	.56	.92		.20	.66
Motor	52	201	.65	.46	.84		.12	.75
Strength	58	207	.79	.55	1.03		.06	.84
Mental skills						**.02**		
Imagery	52	238	.68	.49	.87		.19	.70
Multicomponent	38	195	1.04	.56	1.51		.06	.91
Self-talk	24	99	.75	.57	.93		.20	.52
Goal setting	28	103	.53	.37	.68		.24	.47
Relaxation	12	48	.39	.08	.71		.33	.42
Age						**.00**		
U15	23	151	.76	.46	1.05		.12	.76
U20	49	202	.72	.54	.90		.29	.58
O21	59	303	.73	.50	.96		.10	.81
Gender						**.04**		
Male	46	239	.62	.45	.79		.26	.55
Female	29	138	.90	.64	1.17		.28	.59
Mix	56	293	.68	.47	.88		.13	.78
Research Design						**.00**		
RCT	73	377	.73	.55	.90		.14	.76

Pre-Post	47	265	.66	.53	.79		.32	.47
Quasi	10	42	1.21	-.19	2.61		.06	.93
Participants						**.00**		
Athletes	67	386	.71	.54	.88		.19	.70
Volunteers	64	298	.70	.52	.87		.17	.70
Sport Type						**.00**		
Team	54	309	.68	.53	.83		.36	.48
Individual	77	375	.73	.55	.91		.10	.80
Outcome dimension 1						**.00**		
Adaptive	126	607	.72	.60	.85		.19	.69
Maladaptive	20	76	.62	.38	.86		.13	.63
Outcome dimension 2						**.02**		
Behavioural	101	416	.70	.55	.85		.10	.79
Psychological	49	268	.76	.59	.93		.29	.56
Control						**.01**		
Control	82	418	.75	.58	.91		.14	.74
No control	47	266	.64	.46	.81		.29	.60
Risk of Bias								
Overall Risk of Bias						.01		
High	106	605	.68	.55	.82		.20	.68
Unclear	21	79	.89	.48	1.31		.04	.87

Note. CI = confidence interval; I^2__2 = heterogeneity at Level 2; I^2_*3*= heterogeneity at Level 3; *k* = number of studies; R^2_3 = explained variance at Level 2;

Risk of Bias Within Studies

All studies were assessed for risk of bias according to The Cochrane Risk of Bias and results show that none of the interventions included sufficient controls to be considered low risk of bias. Full risk of bias assessments is presented in Appendix B. The overall risk of bias for all studies is also presented in Table 1. The discrepancies arising were resolved by the three coders, and as a result the interrater agreement for risk of bias indicated 99.30%.

Synthesis of Results

Meta-analysis was conducted on 127 studies (see flowchart in Figure 1). Full meta-analysis results are presented in Table 1and Table 2. The multilevel structural equation modelling analysis examined the overall effect size of mental skills use and its effects for sports or sports-related activities and found a large positive association (d = 0.72 95% CI = .60-.85). The I^2 corresponding to this analysis showed that 18% of the variation was attributable to differences within study and 70% of the variability was between studies. Therefore, moderator analysis was conducted to explain between study variance. Higgins and colleagues' (2003) guidelines were adopted to explain the results where they tentatively assigned low, medium, and high to I^2 values of 25%, 50%, and 75% respectively.

Moderator Analysis

Mental skills. A very small (negligible) between study heterogeneity (R^2 = 0.02) was prevalent for association between different approaches to mental skills training and its use and effect in sports. Multicomponent had the largest positive association, d = 1.04, 95% CI (0.56-1.51) with intervention. Studies that used imagery reported a moderate positive association, d = 0.68, 95% CI (0.49-0.87). Similarly, with self-talk there was a moderate positive association, d = 0.75, 95% CI (0.57-0.93). Goal setting also had moderate positive association, *d* = 0.53, 95% CI (0.37-0.68). Relaxation, however, resulted in a low to medium positive association, *d* = 0.39, 95% CI (0.08-0.71).

Intervention program duration-days. A large portion of between study heterogeneity (R^2 = .69) was prevalent for association between duration of the intervention program and its effect in sports performance. Intervention length of eight to 21 days had the largest effect size, *d* = 0.99, 95% CI (0.01-.1.98). Interventions longer than 70 days also had a high effect size but seemed to lose some of its effectiveness, *d* = 0.76, 95% CI (0.41-1.11). Shorter interventions of seven days and less than one day resulted in a moderate effect size, *d* = 0.55, 95% CI (0.26-0.83) and *d* = 0.57, 95% CI (0.42-0.71), respectively.

Mental practice length-minutes. A large portion of between study heterogeneity (R^2 = 0.71) was prevalent for association between length of mental practice and its effect on sports performance. Effect size was high and largest for studies that employed mental practice sessions of three minutes and less, *d* = 1.37, 95% CI (0.84-1.90). Similar results were reported in previous studies (Etnier & Landers, 1996; Feltz & Landers, 1983). Mental practice between 26-60 minutes also showed large effect sizes, *d* = 0.93, 95% CI (0.62-1.23). Sessions employing mental practice between 15 – 25 minutes produced moderate to large effect sizes, *d* = 0.79, 95% CI (0.50-1.07). Similar findings were reported by Driskell and colleagues (1994). Mental practice sessions between four and seven and over 61 minutes had comparatively lower but moderate effect sizes, *d* = 0.51, 95% CI (0.38-0.64) and *d* = 0.57, 95% CI (0.34-0.80), respectively.

Mental practice trials. A large portion of between study heterogeneity (R^2 = .71) was also prevalent for association between number of trials and its effect on sports performance. Studies that employed seven to 12 and 13-24 trials obtained large effect sizes, *d* = 0.89, 95% CI (0.18-1.59) and *d* = 1.10, 95% CI (0.55-1.66) respectively. Studies employing between one and three and between three and six trials produced moderate effect sizes, *d* = 0.69, 95%

CI = 0.55-0.83) and *d* = 0.64, 95% CI (0.35-0.92). Studies that had over 36 trials also had moderate effect sizes, *d* = 0.55, 95% CI (0.44-0.67). The effect sizes were significantly different.

Outcome variables. Outcome variables did not explain any of the heterogeneity found between studies that examined the relationship between mental skills training and sports performance (R^2 = .00). The outcome variables of cognitive, motor, and strength tasks all had moderate to large (confidence interval) positive associations with mental skills training: *d* = 0.74, 95% CI (0.56-0.92); *d* = 0.65, 95% CI (0.46-0.84); *d* = 0.79, 95% CI (0.55-1.03), respectively.

Age. Age did not explain any of the heterogeneity between mental skills and sports performance (R^2 = .00). Indeed, the age moderation analysis showed a moderate positive association with sports performance in all age groups: *d* = 0.76, 95% CI (0.46-1.05), *d* = .72, 95% CI (0.54-0.90) and *d* = 0.73, 95% CI (0.50-0.96) for age groups under 15, 15-20 years, and over 21 years respectively.

Gender. Gender explained very little of the heterogeneity evident between studies that examined the relationship between mental skills and sports performance (R^2 = .04). It showed that mental skills had a moderate positive association with sports performance in the male group, *d* = 0.78, 95% CI (0.58-0.97). The female group had a large positive association, *d* = 0.90, 95% CI (0.66-1.13), while the mixed group showed a moderate association, *d* = 0.77, 95% CI (0.60-0.94).

Research Design. Study design did not explain the heterogeneity between studies that examined the relationship between mental skills and sports performance (R^2 = .00). RCTs had a moderate positive association with mental skills, *d* = 0.73, 95% CI (0.55-0.90). Pre-post and quasi-experimental designs showed moderate and high positive associations: *d* = 0.66, 95% CI (0.53-0.79) and *d* = 1.21, 95% CI = (0.19-2.61), respectively.

Sport type. Sport type did not explain any of the heterogeneity between studies (R^2 = .00). Team sports, *d* = 0.68, 95% CI (0.53-0.83), and individual sports, *d* = 0.73, 95% CI (0.55-0.91) indicated moderate positive associations with sports performance.

Participants. Participants did not explain any of the heterogeneity between studies (R^2 = .00). Athletes, *d* = 0.71, 95% CI (0.54-0.88) and volunteers, *d* = 0.70, 95% CI (0.52-0.87) had moderate positive association with sports performance.

Risk of Bias. None of the Risk of bias categories explained any of the heterogeneity between studies. Overall Risk of Bias (R^2 = .01) results are presented here: High Risk of Bias, *d* = 0.68, 95% CI (0.55-0.82), Unclear Risk of Bias, *d* = 0.89, 95% CI (0.48-.1.31). None of the studies were identified as Low Risk of Bias.

Publication bias. The amount of bias will be considerable if the funnel plot asymmetry is more pronounced (Sterne, Gavaghan, & Egger, 2000). A publication bias is apparent, and this is evident from an asymmetrical appearance at the bottom of the graph funnel plot (see Figure 2). The examination of the funnel plot showed moderate to high asymmetry, thus representing moderate to high risk of publication bias across studies.

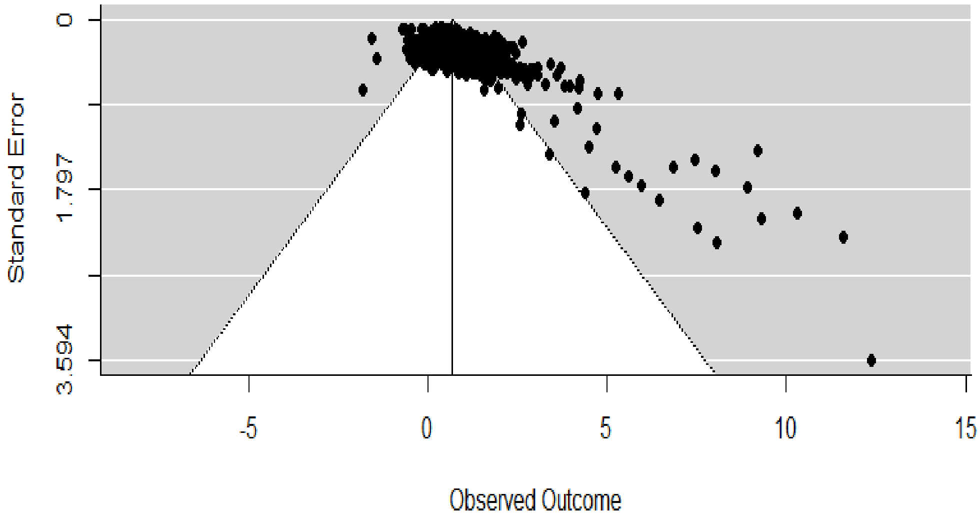

Figure 2. Funnel Plot

Discussion

The present study used the meta-analysis technique and explored the relationship of mental skills use in enhancing sports performance. More precisely, this meta-analysis endeavoured to investigate the four most widely used mental strategies and their effect on optimal sports performance. The meta-analysis also addressed the effects of moderating variables that further identified aspects of the mental strategies that are important in determining the effectiveness of the intervention. A wide range of studies were reviewed for this meta-analysis with less restrictive selection criteria compared to other reviews, such as the one by Driskell and colleagues (1994). Thus, the generalizability of findings should be viewed with caution. The reviewed studies differed in characteristics, such as designs and methodologies, sports, type of mental skills used, outcome variables measured, and participants used in interventions. In line with Feltz and Landers' (1983) study, the methodological and subject characteristics here did not make any significant difference to the outcome variables.

The research findings are consistent with other meta-analyses, such as Feltz and Landers’ (1983) and Hatzigeorgiadis and colleagues’ (2011), in making assumptions that use of mental strategies have demonstrated efficacy in enhancing sport performance. The overall ES for the present meta-analysis was 0.72. This finding supports previously established meta-analyses (Driskell et al., 1994; Feltz & Landers, 1983; Kyllo & Landers, 1995) and shows that ESs associated with moderate to large improvements are meaningful in sporting contexts since even small differences can provide that competitive edge to the athletes.

It was expected that there would be some small inconsistencies in ES when compared to other meta-analyses. This could be due to other studies employing a more limited and selective approach for their inclusion criteria. Furthermore, other studies had used single mental skill reviews, such as imagery (Feltz & Landers, 1983; Lutz et al., 2001) or self-talk (Hatzigeorgiadis et al., 2011), whereas this review investigated four single, common mental skills (i.e., relaxation, goal setting, imagery, and self-talk), as well as multicomponent (combinations of mental skills) aspects of mental practice.

Inconsistencies across studies could also be due to the use of different population groups where some studies used analogue (non-athletic) groups, while others utilised sub-elite and elite athletes. Moore (2003) stated that here is a tendency for studies with analogue groups to provide inflated efficacy data, as this population will not have the same attitudes, skills, external demands, and requirements compared to the athletes. Moore (2003) questioned mental skills as a viable tool for enhancing performance. Unlike Moore’s (2003) study, this meta-analysis showed the positive association of sports performance with other mental strategies (i.e., goal setting, self-talk, relaxation, and multicomponent).

Imagery

Jacobson (1932) explained the psycho-neuromuscular theory which proposed that during imagery rehearsal the actual motor pattern being rehearsed is duplicated thus enhancing the motor performance. The more appropriate and psychological explanation would be that imagery is predictive of confidence which improve athletic performance (Gould, et al., 2014). Mental imagery (e.g., imaging being mentally tough, feeling competent, and being successful) is one way to enhance self-confidence and self-efficacy of athletes (Munroe-Chandler & Hall 2004). Gould et al. (2014) also stated that intrinsic motivation could be improved through mental imagery thus enhancing performance. Results from the current study are in line with numerous other meta-analyses (Driskell, et al., 1994; Feltz and Landers, 1983) that imagery has shown to be effective for improving performance. Imagery is apparently the most common mental strategy used to enhance sports performance, with 34% of the studies included in this review being on imagery. An ES of 0.68 indicated a moderate effect of imagery on sports performance.

Goal setting

Goal setting is a very powerful skill in enhancing performance. Goals need to be on standards of excellence for it to be effective and have to be reached within a given time frame, such as by the end of the certain number of days (Weinberg, 2014). They give individuals a purposeful aim, focus and strength towards their achievements. Effect sizes from this study support the findings of meta-analytic results from Kyllo and Landers (1995) study that overall goal setting improves performance in sport. Goal setting in this meta-analysis had an ES of 0.53. This supporting evidence thus reinforces the findings that goal setting is a successful strategy for improving sports performance.

Self-talk

Self-talk influences individuals' attentional and appraisal processes, thus making a valuable contribution to skill acquisition, learning, and task (Hatzigeorgiadis et al., 2011). Hatzigeorgiadis et al. (2011) stated that in doing so, they regulate behavioural performance enhancement in sport. An ES of 0.75, for self-talk indicated that it is an effective strategy to improve sports performance. A similar finding was reported in Hatzigeorgiadis and colleagues' (2011) meta-analysis, and they recommended that coaches and athletes should embrace self-talk strategies to maximise their performance gains. They found that the type of task or the type of self-talk was a moderating variable. It was not in the scope of this study to explore the type of self-talk (whether instructional or motivational) or the appropriate matching of task (cognitive or behavioural). However, it was important to notice the overall support for the effectiveness of self-talk findings (Hatzigeorgiadis et al., 2011), and that is encouraging for individuals to continue to employ this strategy for optimal performance. This sentiment has also been evident from Tod and colleagues' (2011) systematic review that established the performance benefits from self-talk strategies.

Relaxation

There were very few relaxation meta-analysis studies with which to make accurate comparisons. In this study, relaxation had the lowest ES (0.39) when compared to other mental skill components. The small effect size could be due to the relaxation activities being perceived as at least relevant to performance that required less concentration, and were less enjoyable (Kudlackova et al., 2013). It is possible that participant skill factor may have also contributed to the small effect sizes of relaxation. Kudlackova et al. (2013) stated that relaxation use depends on athlete skill level and reported that some international level athletes reported more relaxation use in competition compared to their less skilled counterparts. Manzoni and colleagues' (2008) meta-analysis, which explored effects of different relaxation techniques at both clinical and non-clinical settings, was also close to making an analytical comparison with this study and they found moderate effect sizes (0.52-0.68) for treatment of anxiety. There were, however, some contradictory findings where Pelka and colleagues' (2016) systematic review found that progressive muscle relaxation as a relaxation strategy was ineffective in performance-oriented settings. However, they also concur that overall, relaxation techniques improve performance.

Multicomponent

A large number of multicomponent studies incorporated imagery with other mental skills, with a majority of them combining imagery with relaxation techniques, finding it to be more effective than stand-alone imagery (Afrouzeh et al., 2015; Coelho et al., 2012). Hatzigeorgiadis and colleagues (2011) found that combining self-talk with other mental skills showed a large effect (ES = 0.98). Evidently, the ES for multicomponent strategy in the current meta-analysis was highest at 1.04, although not significantly different when compared to imagery, goal setting, relaxation and self-talk stand-alone strategies. Papaioannou et al. (2004) iterated that it might be problematic to generalize such findings to elite competitors as it can be argued that the observed improvements could be attributed to learning and repetition.

Brown and Fletcher (2017) reported that there was no difference in the effect sizes of single and multiple interventions, which is in line with the current meta-analysis. Hatzigeorgiadis and colleagues (2011), however, stated that the results must be viewed with caution since most mental skills packages would require a longer period for implementation in comparison to the stand-alone strategies and that this could influence the overall ES.

Length of Mental Practice

An important aspect of meta-analysis is its ability to identify the variables of interest that would need further investigation. Mental practice duration has shown to be effective in significantly improving performance (Bar-Eli, Tenenbaum, Pie, Btesh, & Almog, 1997; Feltz & Landers, 1983). This review considered mental practice and its variants as important aspects that needed further examination. The duration of the mental practice, number of trials, and practice length were moderators of the effects of mental skills on sports performance. A notable point here is that this meta-analysis described mental practice as generally including one or several cognitive training techniques and may have included several mental preparation approaches. The mental practice comparison studies (Driskell et al. 1994; Etnier & Landers, 1996) defined mental practice as imagery or visualization. This meta-analysis was not able to provide necessary clarity on the amount of practice needed for optimal performance since accurate comparisons were not possible with the multicomponent approach to mental practice; other meta-analyses used a single mental strategy. However, there were some comparable findings relevant to previous studies, briefly discussed below.

This study concurs with other reviews (i.e., Etnier & Landers, 1996) that “more” (at least in terms of duration) mental practice is not necessarily better. The groups that received three minutes or less of mental practice improved substantively more than other groups that received more than three minutes of practice. Similarly, longer duration mental practice and those with over 36 trials tend to diminish in strength and do not give optimal performance. Bar-Eli and colleagues (1997) noted that the longer durations of six and eight-week conditions of goal setting practice had a 10-20% reduction in performance gains when compared to the four-week goal setting condition. The results imply that it is not only mental imagery, but also other skills, that could incur a loss in performance gains with longer practice.

Generally, it is expected that a negative relationship would exist between the strength of effect of mental practice and the length of the retention period since the effects of mental practice tends to weaken as the retention interval increases (Driskell et al., 1994). A probable reason for decline in performance over longer mental practice could be that participants are likely to lose focus and become distracted or the skills are simple and easy to acquire and interest wanes over time. Another reason for the less effective long duration mental practice could be that participants may also be getting bored with the program with its longevity. It is necessary for researchers to carry out manipulation checks to identify whether these factors could be contributing to the results.

This review shows that the duration of the mental skills training program and the actual mental practice length are important factors to consider when designing and implementing a mental skills training program. The findings also clearly show that the length or duration of mental practice is a determining factor in its effectiveness in enhancing sports performance. There may be a certain optimal length of practice and after that point, it is detrimental (Driskell et al., 1994). Also notable is the non-linearity of the relationship between the length of mental practice and mental practice effects. Evidently, a similar trend was reported by Feltz and Landers (1983) and Driskell and colleagues (1994). Some probable reasons for this non-linearity could be that for some tasks, the effectiveness of the mental practice depends on the quality of instructions, which could determine the type of mental practice employed by the participants (Feltz & Landers, 1983). Consequently, the ES may be large in some studies, while smaller in other studies with similar or the same tasks (Feltz & Landers, 1983). Feltz and Landers (1983) also stated that different stages of learning could affect effectiveness of mental practice, whereby experienced performers may show small performance gains while novice performers produce large gains with the same length of mental practice. Beyer (2016) stated that prior experience with mental skills training could also significantly contribute to the outcome variable. Another reason for uncertainty of the linear relationship between mental practice and its effects could be that different studies would use different types of tasks with different types of subjects and, thus, report different statistics (Driskell et al., 1994).

There have been some consistencies when it comes to the variants of mental practice and, therefore, future coaches will benefit from the findings emanating from these studies when planning for their competitive seasons. Short sessions of mental practice are good.

Moreover, an intermediate number of short trials spread over an intermediate duration (number of days) seems to be best. Long individual trials that are few in number and over a short duration are worst. This is interesting because it argues against the typical practice of one intensive workshop mode that is a single day, relative to few trials of long duration.

In line with other meta-analyses such as Driskell and colleagues' (1994) and Feltz and Landers' (1983), these results show an acceptable level of certainty on the benefits of mental strategies in sports performance. However, caution needs to be exercised here as more relaxed criteria were adopted to encompass a wide range of mental skills intervention studies.

Strengths and Limitations

There are a number of strengths in this study. A major strength of meta-analysis is its ability to pool the results of multiple studies to generate an integrated result (Walker, Hernandez, & Kattan, 2008). Walker and colleagues (2008) also caution that inaccurate and misleading results can be obtained from meta-analysis if certain conditions that are critical for a reliable meta-analysis are not adhered to. For instance, these could be following a systematically developed selection criteria and addressing the risk of bias. This study addressed these issues, and the strengths and limitations are discussed below.

To this author's knowledge, this is the first meta-analysis that examined, compared, and presented the effect sizes of a multicomponent training that included the four most common mental skills (relaxation, goal setting, imagery, and self-talk) intervention studies. One study (Gardner & Moore, 2006) conducted a comprehensive review of the above mental skills intervention papers but did not report the effect sizes. Hatzigeorgiadis and colleagues (2011) reported the ES for self-talk as a component of multicomponent studies without identifying the other components of the package intervention. Others (Driskell et al., 1994; Feltz & Landers, 1983; Hinshaw, 1991; Kyllo & Landers, 1995) reported effect sizes of single mental skill intervention reviews. In addition, this is the first known study that investigated the moderating effect of the mental practice of the combined five mental skills - training strategies used by athletes. In other meta-analysis studies (Driskell et al., 1994; Hinshaw, 1991), mental practice was only moderated for mental imagery and not for other mental strategies. The findings here are important and can provide researchers and sports stakeholders' empirical information on athletes searching to enhance competitive performance.

Despite numerous strengths of meta-analysis, there are also some limitations to this study. The studies utilized here have not met the descriptions of the well-established interventions as advocated by researchers such as Gardner and Moore (2006) and Birrer and colleagues (2012). Meeting a strict inclusion methodological criteria would exclude a wide range of probable studies and, therefore, can limit a comprehensive evaluation of the effectiveness of the mental skills training program and the generalizablity of the results. Some researchers (Gardner & Moore, 2006) may argue that studies with methodological weaknesses can be wrongfully generalised among populations, and empirical research on these interventions may not be in the best interest of the practitioner. Gardner and Moore's (2006) view would mean that inclusion of a wider range of research studies that did not meet the strict descriptions of well-established intervention studies may have confounded the validity of the analytical findings here. However, Feltz and Landers (1983) countered that argument, and in their research, they included studies regardless of quality. Their approach was adopted here with the caveat that study quality and design were evaluated in the moderator analysis. In this respect, it is critical that there was little or no heterogeneity in relation to these features.

The qualitative approach to using the funnel plot to determine publication bias could have been formalised using trim and fill analysis (Duval, & Tweedie, 2000). Future research could adopt this simple estimation approach. A systematic validity check was conducted via risk of bias using the Cochrane Risk of Bias tool, which indicated that 91% of the studies had overall high risk of bias and 97% did not use blinded key personnel (see Appendix B for further details on risk of bias analysis). Also, no single study described all the risk of bias factors as low, and only five studies had blinding of participants and personnel. Furthermore, bias was evident with no studies reporting any study protocol. Noetel and colleagues (2017) stated that protocol registration could significantly increase internal validity since it requires researchers to declare power calculations, blinding, and randomisation processes. These internal validity criticisms are not uncommon in sporting literature, as coaches and athletes can be resistant to experimental designs in which there is reduced control (Noetel et al., 2017).

It was beyond the scope of this review to include unpublished studies such as thesis and conference papers. It is quite possible that most of the unpublished studies were not submitted due to poor quality or nonsignificant results. However, future research could include relevant unpublished studies to get more rich data on the use of mental skills training in sports performance.

Implications and Conclusion

The meta-analysis findings indicated that mental skills training, either single or multi-component results in better sports performance. There are important implications of this meta-analysis. Evidence from this study further extended the previous findings by exploring the four most widely used mental skills, and it confirms that mental skills training can enhance sports performance. More precisely, athletes can use goal setting, relaxation, self-talk imagery, and multicomponent strategies to enhance their performance. Despite no statistically significant difference, the results showed that multicomponent strategies may be more effective in enhancing sports performance when compared to a stand-alone single strategy. Perhaps future research could explore this further.

Even though mental practice is effective in positively influencing performance, it was seen that this effect declined over time; more mental practice is not necessarily better. However, this assumption could be clouded by the uncertainty of the linear relationship between the length of mental practice and mental practice effectiveness. Future research could use more defined moderator variables such as the experience level of the participants with task types and scoring techniques to examine mental practice effects.

There is limited research in this area and, therefore, it is important to further replicate our findings of the duration of mental practice on subsequent performance. However, there is sufficient information for the coaches and athletes to pay more attention to the duration of mental practice for maximum gain. There is also a need to clarify and agree on a concept that explains what mental practice is. Is it only visualization, or does it encompass other strategies? Some clarity is needed for future research in this field.

In summary, the results from this study provide further evidence that mental skills training can enhance sports performance, and more so with a short duration of mental practice.

Chapter Summary

Even though several studies have found that the use of mental skills training enhances athletes' performance, some have questioned the validity of the results and argued that efficacy has not been fully demonstrated. This study systematically reviewed and conducted a meta-analysis of evidence on mental skills interventions such as imagery, self-talk, relaxation, goal setting, and multicomponent as performance enhancing strategies in the sporting domain.

The intervention studies with any design exploring efficacy in sports performance, meeting the selection criteria, were included in this study. Searches of seven databases were conducted to find a wide range of eligible studies for inclusion in the analysis. A total of 127 studies with 682 effect sizes (ES) were included in the final analysis. Overall, mental skills training had a moderate positive association with performance outcome (d = 0.72 95% CI = 0.60-0.85). The I^2 analysis showed that 18% of the variation was attributable to differences within study and 70% was attributed to between studies. Mental practice duration or length was a moderator variable and has shown to be effective in significantly improving sports performance.

CHAPTER 4

The Test of Performance Strategies (TOPS): Psychometrics of instrumentation and Development of TOPS 2 Short Form

Introduction

Test of Performance Strategies (TOPS)

Psychological questionnaires can be useful in measuring mental skills of athletes. However, their credibility depends on psychometric properties, such that validity and reliability must be clearly demonstrated. The current TOPS 2 is acknowledged as a very popular instrument and is psychometrically appropriate for assessing athletes' use of mental skills in training as well as in competition (Fernandes & Fernandes, 2015; Hardy et. al. 2010; Lourido, Arce, & Ponte, 2018). TOPS 2 is a 68-item revised TOPS self-report instrument designed to measure a range of comprehensive psychological skills, techniques, and strategies used by athletes in competition and during practice (Hardy et al., 2010; Lane, Harwood, Terry, & Karageorghis, 2004; Thomas et al., 1999).

The TOPS original version had 64 items. The TOPS provided valuable information for coaches, practitioners, and other stakeholders: (a) the existing psychological skills and imminent demands; (b) the use of psychological skills during different phases of athlete development; and (c) the efficiency of interventions to advance psychological skills (Lane et al., 2004; Thomas et al., 1999). The original 64-item TOPS and its revised 68-item TOPS 2 are briefly discussed below.

64-item TOPS. Thomas and colleagues (1999) indicated that previous instruments failed to establish the measures of psychological skills beyond doubt. They reviewed and examined a wide range of sport-related instruments, including the Psychological Skills Inventory for Sport (PSIS, Mahoney, Gabriel, & Perkins, 1987); the Athletic Coping Skills

Inventory (ACSI-28, Smith, Schutz, Smoll, & Ptacek, 1995); and the Psychological Performance Inventory (PPI; Loehr, 1986), and came up with the most pertinent skills and processes used for improving sports performance. The previous psychological instruments may have been popular but had question marks as to their psychometric properties. Thomas and colleagues (1999) stated that although the ACSI-28 was stronger than the PSIS, it violated normal confirmatory factor analysis (CFA) procedures and needed to be interpreted with caution. Also, the previous measures mainly focused on the athletes’ use of psychological skills during competition. Committed athletes, however, spend considerable time on practice. Hence, Thomas and colleagues (1999) determined that there was a need for a robust and valid general measures of psychological skills that could be applicable both in practice and competition settings.

Thus, from that review of the wide range of sport-related instruments, the subscales were selected to represent the eight most fundamental psychological skills relevant to successful sports performance (Thomas et al., 1999). The practice subscale had eight factors, including emotional control, self-talk, automaticity, imagery, goal-setting, activation, attentional control, and relaxation. The competition strategies include seven of the eight factors of the practice strategies, with negative thinking replacing attentional control (Thomas et al., 1999). Thomas and colleagues (1999) stated that these factors were selected based on Bandura’s (1977) theory that the level and strength of self-efficacy can be altered with psychological strategies. As such, the scales selected by Thomas and colleagues (1999) reflect generic factors that determine sports performance. There was, however, a question mark on the structural integrity of the TOPS (Lane et al., 2004). Original TOPS subscales were based on exploratory factor analysis (EFA); however, CFA should follow EFA to test the proposed factor structure of the model (Hardy et al., 2010).

Lane and colleagues (2004) also questioned the suitability of using TOPS with adolescents and stated that the language used in some items may be unsuitable for adolescents. There were question marks in relation to some aspects of the factorial validity of the instrument and its application with adolescents (Lane et al., 2004). A study by Lane (2007) argued that when the meanings of items are understood by adolescents, then it reflects that the adults would understand them as well, and he suggested that it is important for the research team to be mindful of the potential participants' reactions to completing the measures designed to assess the target construct. Lane and colleagues carried out the CFA of the 64-item initial TOPS and found it to be lacking good psychometric properties (Fernandes & Fernandes, 2015; Hardy et al., 2010).

Lane and colleagues (2004) also stated that both competition and practice subscales of the TOPS had mixed overall support. They found that neither the competition (CFI = 0.92, TLI = 0.88, RMSEA = 0.05) nor practice (CFI = 0.86, TLI = 0.81, RMSEA = 0.06) adequately fitted the data (Lane et al., 2004). At the subscale level, they found that some subscales showed good fit, while others less so. Lane and colleagues found that 84% of items had excellent loadings, with some items showing weak loadings. A psychometric assessment by Fernandes and Fernandes (2015), in their Brazilian translated TOPS analysis, also reported unsatisfactory fit adequacy for competition (CFI = 0.84, GFI = 0.86, RMSEA = 0.05) and practice (CFI = 0.76, GFI = 0.83, RMSEA = 0.06) scales, and advised caution when using TOPS. Another psychometric examination of the original TOPS competition scale was conducted by Katsikas, Donti and Psychountaki (2011) in a Greek context and they also found weak support for the CFA model (CFI = 0.91, GFI = 0.89, RMSEA = 0.05).

A Revised Version: 68-item TOPS 2. The findings from Lane and colleagues' (2004) investigation prompted the refinement of the TOPS and subsequent development of the TOPS 2. The revised TOPS 2 incorporated a new subscale and some new items to account for the measurement concerns that arose with the initial TOPS (Lane et al., 2004). These are discussed further below.

Hardy and colleagues (2010) first carried out a pilot study with 520 North American participants (mean age = 16.97) using the original TOPS (Thomas et al., 1999). They acknowledged the mixed support for the structural integrity of the TOPS identified by Lane and colleagues (2004) and stated that CFA analysis for both practice and competition showed problematic subscales: the competition subscales of activation, negative thinking, and emotional control were found to be problematic and, likewise, the practice subscales of attentional control, activation, and automaticity were also found to be problematic. The authors then decided to address these problem subscales by developing further items and then re-evaluating the fit. The instrument refinement process is detailed in Hardy and colleagues' (2010) study.

Hardy and colleagues (2010) then conducted a study to further explore the factor structure of the TOPS 2 questionnaire with 220 Australian, 120 North American, and 225 British athletes from 48 different sports across a wide range of ability levels. In their study, Hardy and colleagues (2010) dropped some items while generating further items for the subscales: emotional control in competition as well as for practice, attentional control in competition, relaxation in competition and practice, and automaticity in competition and practice. Thus, the new version of the Test of Performance Strategies (TOPS 2) was developed based on 64 items from the original TOPS and 49 new additional items (Hardy et al., 2010).

Hardy and colleagues (2010) stated that, firstly, the competition and practice subscales were analysed separately, followed by goodness of fit of each pair of subscales, and then, finally, the whole model was tested. Items were removed if they did not meet any of these criteria: having a standardized factor loading greater than 0.40; the standardised residuals associated with the item were modest, less than 0.30; and the modification indices associated with the item were not too high (Hardy et al., 2010). Hardy and colleagues (2010) clarified that they explored indices that were in double figures since it was difficult to specify the precise cut-offs for modification indices.

The item pool was reduced to four items per subscale as a follow-up from the full model analysis that included combination of fit statistics, standardised residuals, modification indices, and theoretical considerations (Hardy et al., 2010). Hardy and colleagues argued that they retained the four items per subscale since it was the case in the original TOPS. Cronbach’s alphas can be problematic with a small number of items, and any larger number of items per subscale may contaminate TOPS data by motivation effects (Hardy et al., 2010).

The results from Hardy and colleagues (2010) study showed that the initial fit for both nine-factor competition (RMSEA = 0.05; CFI = 0.97; NNFI = 0.97) and eight-factor practice (RMSEA = 0.06; CFI = 0.95; NNFI = 0.95) subscales were acceptable. After item reduction, the fit for the competition model improved (RMSEA = 0.04; CFI = 0.98; NNFI = 0.98), particularly for the practice model (RMSEA = 0.05; CFI = 0.97; NNFI = 0.96). Both competition and practice models reported very good item loadings (Hardy et al., 2010). Cronbach’s alphas ranged was from 0.62 (Automaticity) to 0.89 (Emotional Control) for competition and from 0.71 (Activation) to 0.85 (Relaxation) for practice. The factor pattern invariance tests across the British and Australian samples showed good fit for both nine-factor competition (RMSEA = 0.04; CFI = 0.97; NNFI = 0.96) and eight-factor practice models (RMSEA = 0.04; CFI = 0.94; NNFI = 0.93).

Their results revealed that for competition subscales: (a) the models for self-talk, goal setting, and negative thinking met or were better than the fit cut-offs (Hu & Bentler, 1999); and (b) the number of items in emotional control, relaxation,, and automaticity were reduced from six to four to meet the fit criteria of the single factor models of these subscales and the activation subscale was reduced from six to four items during the tests of paired models. Moreover, the TOPS 2 also revealed that for practice subscales: (a) the model for imagery had better than fit criteria cut-offs; (b) the single factor models for self-talk, attentional control, and goal setting also exceeded the fit criteria; (c) the single factor models for activation, relaxation, automaticity, and emotional control all exceeded the fit criteria cut-offs; and (d) the activation, relaxation, automaticity, and emotional control subscales were reduced to four items during the tests of paired models.

The overall fit statistics for the competition and practice inventory were acceptable. Their study further showed that the fit of the eight-factor model was very good and had very good factor loadings. Hardy and colleagues (2010) identified the conceptual problems stated by Lane and colleagues (2004) and eradicated them in the new version, thus producing a much stronger TOPS 2. Moreover, Hardy and colleagues suggested that there is a need to further develop the TOPS 2. They found that even with the good fit statistics, the automaticity subscale required some attention. Overall, the TOPS 2 presented strong psychometric properties and can be used as a research tool to explore research questions and predict extensive competition and practice behaviours (Hardy et al., 2010).

Validation of the TOPS 2. Psychological skills training techniques play a vital role in athletic success and has great impact on the success of the athletes in the world (Saadatifard, Keshtidar & Khoshbakhti), thus it is important to measure the generalizability of TOPS for different populations. It might be harder for culturally diverse populations to fully comprehend the measuring instrument items' abstract formulations, thus there is a need for the instrument to be validated across non-English-speaking countries. Since the development of the TOPS 2, few researchers have cross-validated its psychometric properties. The most recent psychometric examination was by Lourido, Arce, and Ponte (2018), where they administered the TOPS 2 to 1,003 Spanish athletes and analysed only the competition scale of the instrument. Lourido and colleagues (2018) found adequate model fit for the competition scale (CFI = 0.93; TLI = 0.92; RMSEA = 0.04), and they also reported reliability composite values of above 0.70. However, Donti and Katsikas (2014) examined only the TOPS 2 competition scale's psychometric properties in a Greek athletic population and found unsatisfactory fit indices (CFI = 0.88; TLI = 0.85; RMSEA = 0.05). Thus, they concluded that the TOPS 2 competition scales may be used in a Greek population with caution, and further investigation on the TOPS 2 is warranted. Indeed, the frequent use of a subset of the full instrument suggests that the full 68-item version of the instrument might be too long to be included in applied research –particularly in studies that also consider several other constructs.

Development of the TOPS 2 Short Form

A shorter version of the TOPS 2 with high reliability and validity was developed in line with the same principles and guidelines proposed by Smith, McCarthy, and Anderson (2000), Marsh, Ellis, Parada, Richards, and Heubeck (2005), and Marsh and colleagues (2010). The minimum three-item-per-factor guideline (Marsh et al., 2010) was adopted while investigating the factor structure.

The focus of these analyses was to identify three items from each of the 17 factors of the TOPS 2 that would meet the criteria suggested by Marsh and colleagues (2010). The least favourable item in each factor, with respect to the criteria, would be discarded (see item selection criteria in methodology section).

Marsh and colleagues (2010) recommended a set of guidelines to increase the validity of the development and evaluation of short forms of existing psychological instruments: (1) start with a strong instrument; (2) the short form must retain the content coverage of all the factors; (3) all factors on the short form must be adequately reliable; (4) the short form must demonstrate adequate overlapping variance with the original long form; (5) the short form must maintain the factor structure of the original form; (6) the factors on the short form, if appropriate, should be able to preserve the content of sub-domains of each factor in the long form; (7) all factors have validity in an independent sample; (8) the classification rates remain high with the short form, if appropriate; and (9) the trade-off in savings of time and resources would be appropriate in relation to potential loss of validity. These guidelines show its appropriateness for the present study and were considered when developing the TOPS 2 short form.

The Present Investigation

The Problem

The TOPS 2 has been shown to present strong psychometric properties and can be used as a research tool to explore research questions and predict of important practice and competition behaviours (Hardy et al., 2010). However, the 68-item TOPS 2, when supplemented in combination with other multiple measures, can take too much administering time. A shorter version of the TOPS 2 was warranted for the current intervention study (the intervention study is presented in Chapter 5).

Aim

This research aims to further examine the structural integrity of the TOPS 2 and to develop a robust, psychometrically sound, and valid shorter version from the TOPS 2 using recommended procedures (Marsh, Martin, & Jackson, 2010). As such this study: (a) used CFA and Exploratory Structural Equation Modelling (ESEM) to test the structural integrity of the TOPS 2 from the data obtained from the author of original TOPS (Thomas et al. 1999); and (b) developed and tested the structural integrity of a TOPS 2 short form. More precisely, this study tested the factor validity and reliability of the TOPS 2 and its short form.

Statement of Hypotheses

Hypothesis 1. Tests of reliability for the TOPS 2 short form will yield acceptable reliability estimates for each factor that approaches that of the long form (despite its shorter length).

Hypothesis 2. CFA and ESEM will support the *a priori* factor structure of the TOPS 2 short form and the similarity of factors across the long and short forms of the instrument.

Method

The purpose of the present research was to: (a) test the factor validity and reliability of the refined TOPS 2; (b) develop and test the factor validity of a short form (the TOPS 2S); (c) test the factor structures and structural parameters of both forms; and (d) cross check psychometric properties of the TOPS 2S with merged data. A comparison for the TOPS 2 analysis was provided by merging the original TOPS data (Lane et al., 2004) with TOPS 2 data. The rationale behind merging the two groups of data was that since the TOPS 2 retained less than one third of the items from the original TOPS, there were large amounts of missing data.

Criteria for Selecting TOPS 2S Items

These established goals (Marsh et al., 2010) were adopted for selecting 51 items for the TOPS 2S: (a) reduce the length of the current TOPS 2; (b) measure and preserve all 17 factors on the TOPS 2; (c) retain a minimum of three items per subscale (original subscales scales had 4 items); (d) maintain reliability estimates of at least 0.70 and over; and (e) obtain acceptable goodness of fit indexes.

It was important to consider the appropriate number of items in each factor. The items represent part of the constructs; therefore, with more items, there is a greater chance that the constructs will be assessed accurately (Davis, Lane, Devonport, & Scott, 2010). A large number of items, however, sometimes can be counterproductive, as many concepts can be understood using a small number of items (Davis et al., 2010; Gosling, Rentfrow, & Swann, 2003). Bollen (1989) suggested two items per factor if there are multiple factors and the factors are not independent. Marsh, Hau, Balla, and Grayson (1989) and Kline (2005) both recommended a minimum of three items per factor, which the present study adopted. Watson and Clark (1997), however, reported that three items per factor could result in lower than the acceptable (0.70) reliability alpha coefficients. It is acknowledged that the TOPS 2 short form may yield marginally lower reliability coefficients than the TOPS 2 due to the reduction of items in each factor. However, it is anticipated that the alphas will be only marginally smaller and close to 0.70.

The items retained for each subscale were based on the guidelines listed below (see Marsh et al., 2005, 2010; Smith et al., 2000): (1) had the highest factor loadings from each subscale in CFA (this also matched the item-corrected correlations from the reliability procedure); (2) had low cross-loadings as obtained by Mplus's modification indexes. Cross-loadings indicate how much fit would improve if allowed loading onto a factor other than the intended factor that it would measure; (3) had low correlated uniqueness (CUs) with other items in the same subscale, as obtained by Mplus's modification indexes. If more than one item had high correlated uniqueness, then the item with higher CU was dropped; (4) maintained coefficient alpha reliability of at least 0.70; and (5) had retained the breadth of content of the construct (based on researcher's subjective observations).

Sample

The study was based on the secondary data analysis as follows:

1. Existing data from the TOPS 2 instrument were obtained from the lead author (Thomas) of the original TOPS. This data was from a sample of 538 participants

(composed of 286 males (53.2%) and 252 females (46.8%), with *M* age = 22.5) from diverse sports groups.

2. Further secondary data on the original TOPS was obtained from a research study by Lane and colleagues (2004) and merged with TOPS 2 data for further CFA analysis as a comparison to TOPS 2 data analysis. These data were from a sample of 260 participants (composed of 82 males (31.5%) and 175 females (67.3%), with *M* age = 22.5) across diverse sports groups.

Negatively Worded Items

Some items were negatively worded, and these were reverse coded prior to analyses. Method effects identified with reverse coded negatively worded items may be pervasive and have been found to result in inconsistent dimensionality (Magazine, Williams, & Williams, 1996). Some researchers (Weems, Onwuegbuzie, & Lustigal, 2003) found that in educational settings, positive and negative items produced different results. These researchers (Weems et al., 2003) observed that negatively worded items in educational assessments tend to yield significantly lower scores than positively worded items. Roszkowski and Soven (2010) reported that factor analytic investigation of many instruments has indicated spurious factors emerge from negatively worded items. They further found that positive statements had more trait variance and were more valid than negative statements. Hughes’ (2009) study found that incorrect responses to negatively worded items significantly impacted scale means.

Statistical Analysis to Refine the Number of Items

Confirmatory Factor Analysis (CFA) is a strong statistical tool that primarily tests *a priori* hypotheses about the nature of relations among latent constructs such as observed variables and latent factors (Jackson, Gillaspy, & Purc-Stephenson, 2009; Marsh, Balla, & McDonald, 1988; Middleton, 2007). In this study, CFA was conducted with Mplus (version 7.11) using maximum likelihood estimation to investigate the factor structure of the 51-item

TOPS 2S to compare it with the factor structure of the 68-item TOPS 2. Confirmatory Factor Analysis was used to develop the TOPS 2 short form and assess its construct validity. This analysis was also conducted for a merged data sample that was obtained by merging TOPS 2 data and data from the original TOPS (see the sample above).

Consistent with the current practice (see Hardy et al., 2010; Lane et al., 2004) on TOPS analysis, CFA was performed for competition and practice scales separately, through which an assessment of the model fit was examined. Exploratory Structural Equation Modelling (Marsh et al., 2010) was also performed; however, primarily it was to get a comparison of the TOPS model fit and examine the instrument construct validity.

The assessment of goodness of fit is the main objective when testing the model, and the evaluation is associated by the $\chi 2$ test statistic and its accompanying significance, usually $\alpha = 0.05$ (Cunningham, 2009; Harbaugh, 2014). However, the $\chi 2$ is sensitive to sample size (Schumacker & Lomax, 2010). This implies that with a larger sample size, $\chi 2$ increases and, thus, there will be a significant difference between the data and model (Kline, 2005). Hence, it is more likely that we are going to reject the specified model (Harbaugh, 2014). On the other hand, nonsignificant probability levels are indicated by smaller sample sizes (Schumacker & Lomax, 2010).

Researchers (Browne & Cudeck, 1993; Hu & Bentler, 1999; MacCallum & Austin, 2000) suggested a number of other fit statistics derived from the minimised discrepancy function. These fit indices can be divided into one of three types: incremental or comparative fit indices, absolute fit indices, and indices of model parsimony (Harbaugh, 2014). In this study, emphasis was laid on the absolute fit indices such as Root Mean Square Estimation of Approximation to evaluate goodness of fit, the Tucker-Lewis index (TLI), and the comparative fit index (CFI). Root Mean Square Error of Approximation values of 0.05 and less reflect, a model of close fit, while values between 0.05 and 0.08 indicate reasonable fit

(Browne & Cudeck, 1993). The TLI and CFI indices lie between zero (0) and one (1). Values exceeding 0.95 are typically taken to be excellent fit, while values greater than 0.90 are taken to reflect acceptable fit to the data (Bentler, 1990; Marsh, 2010). The CFI fit index was proposed by Bentler (1990) and is widely cited by researchers and is perhaps treated as a golden rule. Marsh, Hau, and Wen (2004) suggested that CFI fit indexes should not be treated as golden rules, but rather should form the basis of preliminary interpretations that must be followed in relation to the specific details of the research.

The present research examined CFA and ESEM of TOPS 2 subscales to determine how items loaded onto each factor (see below for further discussion). Factor cross-loadings, factor variances, factor covariance, and item uniqueness were also compared. The least favourable item that did not meet the item selection criteria (Marsh et al., 2010) was removed. The item deleting process also included examining the full factor model CFA, series of one-factor congeneric CFA models, and Cronbach's alpha coefficients (Middleton 2007).

ESEM vs. CFA

Exploratory Structural Equation Modelling incorporates confirmatory tests of *a priori* factor structures, predictive relations between latent constructs and multigroup/multioccasion tests of full measurement invariance (Marsh, Morin, Parker, & Kaur, 2014). The ESEM is an integration of EFA within the CFA/SEM framework (Morin & Maïano, 2011). It has some of the best features of exploratory factor analysis (EFA), CFA, and structural equation modelling (SEM) that are integrated into its statistical procedures (Marsh et al., 2011). The psychometric tests that are typically reversed to CFA within an EFA measurement models could be conducted through ESEM (Morin & Maïano, 2011). Given the large number of estimated parameters, the fit indices that correct for parsimony (TLI and RMSEA) may be particularly important in ESEM (Marsh & Lüdtke, et al., 2010; Morin & Maïano, 2011). The

ESEM approach differs from CFA approaches where indictors within the expected factors are free to cross-load on other factors (Marsh et al., 2011). Marsh and colleagues suggested that the current CFA standards, where all cross-loadings are specified to be zero, are too restrictive and, hence, many psychological instruments used in applied research do not meet the minimum criteria of acceptable fit. Marsh and colleagues (2011) recommended using ESEM in conjunction with CFA to get results that are more definitive.

Multitrait-multimethod (MTMM) Analysis

The MTMM analysis provides a strong path to measure stability of a multidimensional instrument and is one of the standard criteria for appraising measurement instruments such as the TOPS 2. It is widely used to evaluate support for convergent and discriminant validity (Marsh, Asci, & Tomas-Marco, 2002; Marsh, Morin, Parker, & Kaur, 2014; Marsh, Tomas-Marco, & Asci, 2002; Marsh et al., 2010) of the TOPS 2S.

Multitrait-multimethod analysis assesses construct validity by measuring multiple traits with multiple methods (Marsh et al., 2014). The current study measured competition vs. practice subscales to examine the convergent and discriminant validity of both the TOPS 2 and the TOPS 2S. In such a case, competition and practice were treated as two “methods.” Although there are important problems with guidelines used in Campbell and Fiske’s (1959) design, they were adapted in the present study for MTMM analysis (Marsh et al., 2014). Marsh and colleagues stated that many of the objections to Campbell-Fiske guidelines can be eliminated when multiple indicators are used to represent each scale, resulting in CFAs at the item level with a MTMM matrix of latent correlations. Marsh and colleagues further stated that when compared to ESEM solutions, the CFA model provides a poorer fit with inflated correlations among different factors that are particularly critical in MTMM studies. They argue that ESEM is better suited to the construction of latent MTMM correlations matrices that can be evaluated in relation to the Campbell-Fiske guidelines.

The four validation processes advocated by Campbell and Fiske (1959) adopted here were: (a) entries in the validity diagonal (also known as monotrait-monomethod values) were examined, and the evidence of convergent validity was shown with the diagonal values being significant from zero and also if sufficiently large; (b) the higher values in the validity diagonal compared to the values lying in its column and row in the heterotrait-heteromethod triangles suggest discriminant validity; (c) the third process involves comparing the values of a given variable in the validity diagonal with its values in the heterotrait-monomethod triangles, and in this process the variable should correlate higher to measure the same trait than to measures of different traits that employ the same method; and (d) all of the heterotrait triangles of monomethod and heteromethod should show the same pattern of trait interrelationship. The last two processes also provide evidence for discriminant validity.

Results

Reliability

The TOPS 2 reliability estimates were consistently high for each factor (Table 3). There were four items in each factor for this instrument. Preliminary investigation of the TOPS 2 showed good reliability across all 17 factors. The internal consistency estimates for the competition subscales ranged from 0.826 to 0.893 (mean $\alpha = 0.858$). The internal consistency estimates for practice subscales ranged from 0.718 to 0.873 (mean $\alpha = 0.811$).

Table 3

Comparison of Reliability Coefficients based on Short and Long Forms

Subscale	4-item comp	3-item comp	4-item prac	3-item prac
Goal setting	.863	.865	.869	.855
Self-talk	.839	.828	.826	.788
Imagery	.864	.856	.789	.748
Attention Control	.858	.823	.817	.766
Activation	.857	.825	.718	.686
Emotional Control	.893	.890	.804	.764
Automaticity	.826	.768	.782	.801
Relaxation	.888	.907	.873	.866
Negative Thinking	.834	.813		
Median	.858	.828	.811	.777
Mean	.858	.842	.810	.784

Note. 4 item comp = competition items from the TOPS 2; 3 item comp = competition items from the TOPS 2 short form; 4 item prac = practice items from TOPS 2; 3 item prac = practice items from the TOPS 2 short form.

The TOPS 2S reliability estimates were also consistently high for each subscale (Table 3). There were three items in each factor for the short form. The TOPS 2S investigation also showed good reliability across all 17 factors. Internal consistency estimates for the competition subscales ranged from 0.768 to 0.907, with median α = 0.828, and mean α = 0.842. The internal consistency estimates for practice subscales ranged from 0.686 to 0.866, with median *α* = 0.777 and mean α = 0.784. These results only marginally differ from the TOPS 2 long form. Although alpha values of 0.70 are accepted as a good indicator of internal reliability, 0.60 is acceptable for factors with lower items, such as in this case where each factor has three items (Loewenthal, 2001). Moreover, 0.686 is only marginally below 0.70 and is accepted as adequate reliability due to the smaller number of items in the subscales (Nunnally & Bernstein, 1994; Tabachnick & Fidell, 2001).

The Cronbach's alphas calculated for the TOPS 2S subscales were lower than 0.80 but above 0.69. The lowest α of 0.69 for the three-item activation subscale (TOPS 2S) was in accordance with α obtained for the four-item TOPS 2, *α* = 0.72.

Confirmatory Factor Analysis (CFA) of the TOPS2

In relation to CFA, the confirmatory fit indices fell in the traditional and contemporary criterion advocated by Hu and Bentler (1999) and Kline (1998). The RMSEA, CFI, and TLI showed adequate to good fit for the TOPS 2, TOPS 2S, and merging data models (Table 4).

The 17 factor TOPS 2S, containing 51 items, had adequate fit and had similar results to the TOPS 2 model with RMSEA = 0.05; CFI = 0.92; and TLI = 0.91). The 17 factor TOPS 2 containing 68 items had adequate fit with RMSEA = 0.04; CFI = 0.91; and TLI = 0.90. The differences between fit indices for TOPS 2S and TOPS 2 models were minimal.

Competition subscales. The CFA for the TOPS 2 nine-factor competition scale containing 36 items showed good support for the model, and CFA showed RMSEA = 0.05; CFI = 0.94; TLI = 0.94. The fit for the TOPS 2S competition scale, containing 27 items, showed good model fit with RMSEA = 0.04; CFI = 0.97; and TLI = 0.97. There was a noticeable improvement in the fit indices of RMSEA, CFI, and TLI for the three-item scales in comparison to the CFA index obtained from the TOPS 2 analysis. In comparison to CFA, the ESEM results of the TOPS 2S for competition was RMSEA = 0.03; CFI = 0.99; TLI = 0.98. There was an improvement in all fit indices for ESEM. The ESEM for four-item TOPS 2 also showed significant improved model fit compared to the four-item CFA (see Table 4).

Practice subscales. The practice scale with three items per subscales and a total of 24 items showed adequate fit with RMSEA = 0.05; CFI = 0.95; TLI = 0.94. This result was similar to the three-item TOPS 2 practice scale, which also had adequate model fit with RMSEA = 0.05; CFI = 0.93; TLI = 0.92. There was a slight improvement in the CFI and TLI for the three-item practice analysis when compared to the TOPS 2 analysis. There was a decrease in RMSEA value, thus indicating support for three items per subscale as a more parsimonious model. Overall, the findings supported a more parsimonious 3-item model. In comparison to CFA, the ESEM for the TOPS 2S practice also showed some improvement in model fit (see Table 4). Exploratory Structural Equation Modelling results for the TOPS 2S practice showed RMSEA = 0.05; CFI = 0.97; TLI = 0.98. There was only a marginal improvement in CFI index. The practice results in ESEM for the 4-item TOPS 2 also showed significant improved model fit when compared to the 4-item CFA results (see Table 4).

Confirmatory Factor Analysis for Merged Data

Confirmatory Factor Analysis was conducted with merged data to provide a comparison for TOPS 2 analysis. The comparison results of the CFA for the merged data sample are shown in Table 5. The fit indices for the 17 factor merged data containing 68 items were adequate and showed the values of RMSEA = 0.04; CFI = 0.92; and TLI = 0.91. The fit for the 17 factor TOPS 2S (using merged data with three items per factor) containing 51 items was also adequate and a slightly better fit than the 68-item merged model, and resulted in RMSEA = 0.03, CFI = 0.95, and TLI = 0.94. In comparison to the TOPS2, the TOPS 2S analysis from the merged data indicated a slightly better fit.

Competition subscales. Confirmatory Factor Analysis for the four-item, nine factor merged data competition scales containing 36 items showed good support for the model. The results showed RMSEA = 0.04; CFI = 0.95; and TLI = 0.94. The fit for the merged data three-item competition subscales, containing a total of 27 items, also showed good fit with the values: RMSEA = 0.03; CFI = 0.98; and TLI = 0.97. As seen previously in the TOPS 2 data analysis, here also was a noticeable improvement in the fit indices of RMSEA, CFI, and TLI for the three-item subscales.

Practice subscales. The fit for the eight factor merged data practice scales, which had 32 items, showed adequate fit with the values of RMSEA = 0.04; CFI = 0.93; TLI = 0.92. The merged data three-item practice scales also showed adequate fit with RMSEA = 0.04, CFI = 0.95, and TLI = 0.95. There was no apparent significant change in the fit indices for the three-item subscales analysis. Similar results were obtained for the three-item TOPS 2 practice analysis.

Factor Loadings

A strong item is indicated by high factor loadings and low error terms. Factor loading higher than 0.71 is considered excellent and loadings over 0.63 are considered very good (Comrey & Lee, 1992; Tabachnick & Fidell, 2001). The factor loadings for the present study were all significant at $p<.001$.

Competition factor loading. The factor loading range for four-item TOPS 2 competition scales was from 0.63 to 0.90 (see Appendix D). The competition scales had 33 items above 0.70, with 15 of them having factor loadings above 0.80. The factor loading range for three-item competition scales was from 0.68 to 0.90 (Table 6). One item had factor loading of 0.68, while the rest of the items were above 0.70, and fourteen items were above 0.80. The average factor loadings for four item and three-item subscales were very similar. The results show that the TOPS 2S competition items have strong factor loadings.

Table 4

CFA and ESEM of TOPS 2 and TOPS 2S

	CFA		TOPS 2				ESEM					
Fit Indices	All factors		Comp		Prac		All factors		Comp		Prac	
	4-item	3-item	4-item	3-item	4-item	3-item	4-item	3-item	4-item	3-item	4-item	3-item
Chi-square	4155.5	2472.7	1261.7	531	973	482.8	2661.17	1236.97	527.97	203.62	439.09	245.0
df	2074	1139	588	288	436	224	2278	832	342	144	268	144
RMSEA	0.043	0.047	0.048	0.04	0.048	0.046	0.033	0.033	.032	0.028	0.034	0.047
CFI	0.909	0.922	0.943	0.973	0.931	0.952	.951	0.971	.982	0.992	.974	0.970
TLI	0.900	0.909	0.936	0.967	0.921	0.941	.934	0.956	.967	0.981	.951	0.927

Note: All factors = 17 factors of Competition and Practice, Comp = Competition, Prac = Practice df = Degrees of Freedom RMSEA = Root Mean Square Error of Approximation, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index

Table 5

Comparing CFA of TOPS 2, TOPS 2S with Merged Data

			TOPS 2				Merged data					
Fit Indices	All factors		Comp		Prac		All factors		Comp		Prac	
	4-item	3-item	4-item	3-item	4-item	3-item	4-item	3-item	4-item	3-item	4-item	3-item
Chi-square	4155.5	2472.7	1261.7	531	973	482.8	4274	2085.3	1262.5	536.7	1047.7	507.3
df	2074	1139	588	288	436	224	2074	1088	558	288	436	224
RMSEA	.043	.047	.048	.040	.048	.046	.036	.034	.040	.033	.042	.040
CFI	.909	.922	.943	.973	.931	.952	.916	.948	.949	.976	.933	.955
TLI	.900	.909	.936	.967	.921	.941	.908	.939	.943	.970	.923	.945

Note: All factors = 17 factors of Competition and Practice, Comp = Competition, Prac = Practice df = Degrees of Freedom RMSEA = Root Mean Square Error of Approximation, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index

Practice factor loading. The factor loading range for four-item TOPS 2 practice scales was from 0.50 to 0.86 (Appendix E). The practice scales had one item with a factor loading of 0.50 and the rest of the items with loadings above 0.61. It had 22 items with factor loadings ≥ 0.70, with six of these items having factor loadings ≥ .80. The factor loadings range for three-item practice scales ranged from 0.68 to 0.87 (Table 7). It had 16 items with factor loadings ≥ .70, with seven of these items ≥ .80. The average factor loadings for four-item and three-item subscales were also evenly matched, and the correlation coefficients for four-item and three-item subscales are 0.42 and 0.44 respectively (Table 8). Thus, the TOPS 2S practice items also showed strong factor loadings, indicating good item strengths.

Factor Loadings for Merged Data

Merged data competition factor loadings. The factor loading range for merged TOPS data four-item competition scales was from 0.65 to 0.90 (Appendix F). The competition scales had 31 items ≥ 0.70, with 13 of them having factor loadings above 0.80. The factor loading range for three-item competition scales was from 0.66 to 0.90 (Appendix G). Two items had factor loadings below 0.70, while the rest of the items were ≥ 0.70, and ten items above 0.80 (Table 8). The correlation coefficients for four-item and three-item subscales were 0.51 and 0.52, respectively. These results very closely resemble the TOPS 2 (long and short form) factor loading analysis.

Merged practice factor loadings. The factor loading range for merged four-item practice scales was from 0.50 to 0.86 (Appendix H), which was the same as that for the TOPS 2 data analysis. The practice scales had two items below 0.60, while rest of the items had loadings ≥ 0.61. It had 17 items with factor loadings ≥ 0.70 and six of these items with factor loadings ≥ 0.80.

The factor loading range for three-item practice scales was from 0.68 to 0.87 (Appendix I). It had 16 items with factor loading ≥ 0.70, with five of these items ≥ 0.80

(Table 8). The correlation coefficients for four-item and three-item subscales were 0.40 and 0.44 respectively.

These results have strong factor loadings that indicate good item strength, and closely resembled those obtained from the TOPS 2 and TOPS 2S data analysis.

MTMM Results

The MTMM analyses of the TOPS 2 and TOPS 2S are used to test convergent, discriminant, and construct validities and, as such, require multiple indicators of the same construct to be substantially correlated with each other (Marsh, 1989; Marsh et al., 2002). These correlations, however, must be considerably less correlated with indicators of different constructs (Marsh, 1989).

The 8 x 8 correlation matrix relating to the sixteen TOPS 2S factors can be seen in the MTMM matrix (Table 9). Since this is a matrix of latent variables, the correlations are free of measurement error. The MTMM analysis illustrates an 8 x 8 matrix correlation matrix with eight traits (latent TOPS 2 factors) and two methods (practice and competition). The eight coefficients (monotrait-heteromethod correlations) are seen as the convergent validities.

The convergent validities represent correlations between the same factors assessed by different methods, such as monotrait-heteromethod (MTHM) correlations (Campbell & Fiske, 1959; Marsh et al. 2010). The MTMM results obtained for the TOPS 2S (Table 9) show that the eight convergent validities (shaded in grey) were consistently high (mean = 0.75, range = 0.586 - 0.915), and only the coefficients for attentional control (0.59), goal setting (0.67), and activation (0.67) were less than 0.70. Similar patterns of results were obtained when an ESEM MTMM analysis was carried out between competition and practice scales (mean = 0.75, range = 0.564 - 0.991, see Table 10).

Table 6

Factor Loadings for TOPS2S Competition Subscales

Subscale	Item	Estimate	Error
Goal setting	Q6. During competition I set specific result goals for myself.	.753	.022
	Q17. I set very specific goals for competition.	.869	.016
	Q26. I set personal performance goals for a competition.	.861	.017
Self-talk	Q20. I say things to myself to help my competitive performance.	.751	.023
	Q22. I manage my self-talk effectively during competition.	.811	.019
	Q33. I talk positively to myself to get the most out of competitions.	.795	.020
Imagery	Q21. At competitions, I rehearse the feel of my performance in my imagination.	.806	.019
	Q31. I imagine my competitive routine before I do it at a competition.	.782	.021
	Q35. I rehearse my performance in my mind at competitions.	.874	.016
Negative Thinking	Q7. My self-talk during competition is negative.	.773	.022
	Q9. During competition I have thoughts of failure.	.716	.025
	Q19. I keep my thoughts positive during competitions.	.819	.019
Emotional Control	Q37. My emotions keep me from performing my best at competitions.	.821	.017
	Q38. My emotions get out of control under the pressure of competition.	.851	.015
	Q45. I have difficulty with my emotions at competitions.	.891	.013
Activation	Q44. I can get myself ready to perform when I am at competitions.	.790	.019
	Q53. I can psych myself to perform well in competitions.	.750	.022
	Q58. I can get my intensity levels just right for competition.	.803	.018
Relaxation	Q41. I use relaxation techniques as a coping strategy at competitions.	.901	.012
	Q54. I use relaxation techniques during competitions to improve my performance.	.899	.012
	Q57. If I'm starting to "lose it" at a competition, I use a relaxation technique.	.827	.016
Automaticity	Q56. I am able to perform skills at competition without having to consciously think about them.	.716	.026
	Q60. I am able to trust my body to perform skills in competition.	.795	.023
	Q62. In competition, I am sufficiently prepared to be able to perform on automatic pilot.	.675	.029
Attention Control	Q51. I am able to control distracting thoughts during competition.	.756	.022
	Q64. I focus my attention effectively during competition.	.837	.018
	Q67. I have trouble maintaining concentration during competition.	.763	.022

Note. Factor loadings are good. All factor loadings are significant at $p < .001$.Error = standard errors

Table 7

Factor Loadings for TOPS2S Practice Subscales

Subscale	Item	Estimate	Error
Goal setting	Q1. I set realistic but challenging goals for practice.	.780	.021
	Q23. I set goals to help me use practice time effectively.	.842	.018
	Q30. I have very specific goals for practice.	.823	.019
Imagery	Q3. During practice I visualize successful past performances.	.694	.030
	Q8. I rehearse my performance in my mind before practice.	.662	.031
	Q24. At practice, when I visualize my performance, I imagine what it will feel like.	.752	.027
Attention Control	Q4. My attention wanders while I am training.	.709	.029
	Q13. I am able to control distracting thoughts when I am training.	.696	.031
	Q25. During practice I focus my attention effectively.	.760	.028
Self-talk	Q2. I say things to myself to help my practice performance.	.697	.028
	Q11. I manage my self-talk effectively during practice.	.745	.024
	Q29. I talk positively to myself to get the most out of practice.	.702	.024
Activation	Q42. I can psych myself to perform well in practice.	.671	.031
	Q55. I can get myself “up” if I feel flat at practice.	.635	.033
	Q68. I can get my intensity levels just right for practice.	.646	.032
Emotional	Q36. I can control my emotions when things are not going well at	.686	.031
Control	practice.	.762	.029
	Q50. My emotions keep me from performing my best during practice.		
	Q65. My practice performance suffers when something upsets me at training.	.729	.029
Automaticity	Q18. At practice, I can allow the whole skill or movement to happen naturally without concentrating on each part.	.665	.030
	Q43. I am able to perform skills at practice without having to consciously think about them.	.803	.026
	Q59. During practice, I can perform automatically without having to consciously control each movement.	.803	.026
Relaxation	Q5. I practise using relaxation techniques at workouts.	.808	.019
	Q10. I use practice time to work on my relaxation technique.	.805	.020
	Q46. During training sessions I use relaxation techniques to improve my performance.	.867	.017

Note. Factor loadings are good. All factor loadings are significant at $p < .001$.

Table 8

Average Factor Loadings of the Standardized Competition and Practice Subscales

	Merged data		**Thomas data**	
	Av Factor Loading	**Av Factor Loading**	**Av Factor Loading**	**Av Factor Loading**
Comp Subscales	**4-item**	**3-item**	**4-item**	**3-item**
Goal Setting	.775	.806	.790	.827
Self-talk	.744	.771	.765	.786
Imagery	.783	.823	.788	.821
Negative Thinking	.714	.730	.750	.769
Emotional Control	.813	.844	.824	.854
Activation	.763	.770	.775	.871
Relaxation	.819	.877	.818	.876
Automaticity	.737	.721	.744	.729
Attention Control	.771	.775	.780	.785
Correlation coefficient	.510	.521	.420	.553
Prac Subscales	**4-item**	**3-item**	**4 item**	**3 item**
Goal Setting	.760	.783	.792	.815
Imagery	.691	.695	.696	.703
Attention Control	.693	.701	.731	.722
Self-talk	.722	.698	.737	.715
Activation	.615	.645	.627	.651
Emotional Control	.708	.725	.715	.726
Automaticity	.698	.763	.693	.757
Relaxation	.784	.817	.795	.827
Correlation coefficient	.397	.443	.420	.444

Note. ** = Correlation is significant at 0.01 level.

The results also showed that the validity diagonal value for both ESEM and CFA analysis were higher than the values in its column and row in the heterotrait-heteromethod (HTHM) sub square matrix (mean = 0.37; range = 0.124 - 0.628) block. The stability diagonal values indicated that the TOPS 2S has met the criteria for convergent validity. Similar results were obtained for TOPS 2 and merged data samples (see Table 9: Table 10; Appendix J-M).

The correlations between different factors on the same method, heterotrait-monomethod (HTMM) correlations in the diagonal sub matrixes (Mean = 0.49, Range = 0.120 - 0.871), were only slightly larger than the HTHM sub-triangle correlations and also substantively lower than the convergent validity in most cases. All convergent validity values were higher than HTMM correlations except the: CA-PA (0.667), which had two out of fourteen higher HTMM triangle values and CAC-PAC (0.586), which also had one out of fourteen higher HTMM triangle values, while for CG-PG (0.667) only two out of fourteen correlations had higher HTMM triangle values. Matching competition and practice scales reflect convergent validity. The 16 latent factors are designed to be parallel and scales are closely matching (see Marsh et al., 2002). Marsh and his colleagues (2002) suggested that MTMM analysis correlations between matching traits show convergent validity and that it is useful to evaluate correlations among the factors representing the same instrument.

The validation process for discriminant validity can be evidenced by the comparison of diagonal validity values with 56 HTHM and 56 HTMM correlations. Campbell and Fiske (1959) stated that discriminant validity is evidenced when “a variable correlate higher with an independent effort to measure the same trait than with measures designed to get at different traits which happen to employ the same method” (p. 83

Table 9

Correlation Matrix for CFA Three-item Subscales

	PG	PI	PAC	PST	PA	PEC	PAU	PR	CG	CI	CAC	CST	CA	CEC	CAU	CR	CNT
PG	1.000																
PI	.707	1.000															
PAC	.530	.366	1.000														
PST	.705	.670	.460	1.000													
PA	.653	.568	.704	.669	1.000												
PEC	.214	.167	.495	.354	.562	1.000											
PAU	.223	.280	.367	.273	.496	.350	1.000										
PR	.449	.600	.195	.625	.428	.175	.120	1.000									
CG	.667	.490	.364	.488	.485	.155	.171	.265	1.000								
CI	.517	.870	.191	.537	.507	.201	.167	.453	.550	1.000							
CAC	.423	.444	.586	.454	.540	.501	.328	.203	.522	.469	1.000						
CST	.539	.628	.339	.915	.549	.330	.199	.567	.556	.669	.592	1.000					
CA	.453	.471	.415	.536	.667	.474	.357	.279	.527	.583	.871	.720	1.000				
CEC	.216	.267	.336	.334	.358	.744	.220	.124	.295	.310	.705	.474	.729	1.000			
CAU	.315	.380	.383	.364	.540	.427	.729	.238	.436	.428	.746	.522	.848	.563	1.000		
CR	.362	.498	.162	.571	.422	.201	.129	.854	.301	.486	.303	.661	.408	.233	.347	1.000	
CNT	.391	.421	.431	.528	.500	.585	.266	.335	.436	.461	.739	.722	.773	.757	.661	.436	1.000

Note. Letters starting with P have Practice subscales and those starting with C have competition subscales: G = Goal Setting, I = Imagery, AC = Attention Control, ST = Self-Talk, A = Activation, EC = Emotional Control, A = Automaticity, R = Relaxation and NT = Negative Thinking.

Table 10

Correlation Matrix for ESEM Three-item Subscales

	PG	PI	PAC	PST	PA	PEC	PAU	PR	CG	CI	CAC	CST	CA	CEC	CAU	CR	CNT
PG	1																
PI	0.572	1															
PAC	0.427	0.261	1														
PST	0.541	0.525	0.252	1													
PA	0.578	0.399	0.532	0.499	1												
PEC	0.155	0.090	0.446	0.227	0.435	1											
PAU	0.218	0.201	0.287	0.198	0.45	0.291	1										
PR	0.404	0.534	0.145	0.535	0.361	0.179	0.107	1									
CG	0.661	0.448	0.312	0.430	0.451	0.139	0.175	0.262	1								
CI	0.471	0.873	0.148	0.421	0.469	0.171	0.152	0.446	0.543	1							
CAC	0.342	0.387	0.564	0.299	0.385	0.438	0.277	0.128	0.457	0.393	1						
CST	0.397	0.468	0.18	0.991	0.395	0.208	0.127	0.473	0.473	0.540	0.331	1					
CA	0.349	0.379	0.248	0.389	0.63	0.335	0.257	0.206	0.432	0.506	0.655	0.452	1				
CEC	0.150	0.216	0.291	0.268	0.261	0.735	0.186	0.088	0.272	0.267	0.638	0.303	0.521	1			
CAU	0.261	0.288	0.320	0.250	0.448	0.389	0.732	0.203	0.410	0.393	0.655	0.322	0.662	0.502	1		
CR	0.318	0.438	0.104	0.495	0.394	0.188	0.125	0.849	0.299	0.484	0.230	0.556	0.331	0.192	0.311	1	
CNT	0.301	0.318	0.376	0.339	0.382	0.556	0.200	0.281	0.354	0.360	0.582	0.475	0.553	0.641	0.531	0.348	1

Note. Letters starting with P have Practice subscales and those starting with C have competition subscales: G = Goal Setting, I = Imagery, AC = Attention Control, ST = Self-Talk, A = Activation, EC = Emotional Control, A = Automaticity, R = Relaxation and NT = Negative Thinking.

The results obtained show that the criteria had met the requirements for most variables. The following correlations were obtained: diagonal goal setting correlations showed only two higher value correlations with practice self-talk and practice imagery variables in the corresponding column; imagery correlations met requirements; attention control correlations showed four higher correlations with practice activation, competition activation, competition emotional control, and competition automaticity; self-talk correlations met requirements; activation correlations showed two higher correlations with competition emotional control, and competition automaticity; emotional control correlations met requirements; automaticity correlations met requirements; and relaxation correlations met requirements. The information above also provided evidence for discriminant validity.

The fourth aspect of the question of validity can be seen when the same pattern of trait interrelationship is apparent in both blocks of the HTMM and HTHM correlation matrix (Table 11). The slight variation found in the levels of correlation (stated in above paragraph) did not have any significant effect on TOPS 2S meeting the fourth criteria on discriminant validity. A similar pattern of results was found for the TOPS 2 and merged data sample (Appendix J-M).

Although the convergent validities are a bit lower and discriminant validity is a bit weaker on the short form, there is only a very little difference. Overall, the MTMM analysis provides good support for the convergent and discriminant validities of the TOPS 2 short form.

Table 11

Comparison of MTMM Correlations Based on Short and Long Forms

Description	Mean	Median	High	Low
HTMM Short	.488	.496	.871	.120
HTMM Long	.470	.469	.832	.096
HTHM short	.373	.372	.613	.124
HTHM Long	.359	.365	.667	.108
MTHM Short	.754	.737	.915	.586
MTHM Long	.760	.769	.891	.615

Note: HTMM = Heterotrait Monomethod, HTHM = Heterotrait Heteromethod, MTHM = Monotrait Heteromethod

Discussion

The main objective of the present study was to develop a robust and valid Test of Performance Strategies (TOPS2) short form. The *a priori* model formed the basis of the CFA analysis. It was, therefore, necessary to firstly examine the current TOPS 2's psychometric properties and review the original TOPS to determine the overall support and strength of TOPS 2S. The main focus of ESEM was its comparison to CFA solutions. Both ESEM and CFA provided good fit to the TOPS 2S. Exploratory Structural Equation Modelling obtained better results in terms of model fit; however, since the results of the correlation pattern were similar, the focus on reporting was more on CFA. Marsh and colleagues (2014), however, stated that ESEM routinely indicates a more accurate estimation of the factor correlation and, thus, recommended that both ESEM and CFA should be applied to the same data for a thorough analysis.

The present study examined the appropriateness of the short form of the TOPS instrument. The psychometric properties, such as reliability, factor structure, correlated uniqueness, and cross-loadings of the TOPS 2 and TOPS 2S were thoroughly examined. This study adopted a construct validity approach and the proposed set of guidelines recommended by Marsh and colleagues (2010) were closely followed for the examination, development, and evaluation of the TOPS 2S.

The evaluation guidelines proposed by Marsh and colleagues (2010) and also recommended by Smith and colleagues (2000) were considered when developing the TOPS 2S, and four basic relevant guidelines used for the present study are presented below:

(a) A strong original instrument was a fundamental requirement for developing the short form. The present study started with a much stronger TOPS 2 instrument. The conceptual problems of the original TOPS raised by Lane and colleagues (2004) were addressed by Hardy and colleagues (2010) in their refinement of the TOPS. The CFA reported by Hardy and colleagues (2010) and the present study indicated strong support for the use of the TOPS 2 to measure the use of psychological skills and strategies in training and competition environments.

(b) Short form should retain the content coverage of each factor. The MTMM analysis of the TOPS 2 and TOPS 2S was used to test this assumption, and also the merged data analysis of the long and short form both indicated that the content coverage of the two instruments is invariant (see Marsh et al., 2010). The MTMM analysis, where multiple traits are assessed by multiple methods and in parallel analysis of the short and long form, is a strong approach and showed strong support for construct validity of the TOPS 2S and its equivalence with the TOPS 2.

(c) Each factor on the short form must be adequately reliable. Marsh and colleagues (2010) recommended reliability estimates of at least 0.80 whereas Smith and colleagues (2000) accepted reliability coefficients of 0.70 to be adequate. The Cronbach's alpha values obtained for the TOPS 2 short form subscales in the present study were, comparatively, very close to the alpha values of the TOPS 2 long form. Reliability Cronbach's alphas indicated that the TOPS 2S compared very well to the TOPS 2 and showed good reliability across all 17 factors. All competition alphas were 0.80 and over except for automaticity (0.77). The practice scale Cronbach's alpha values were 0.70 and over except for activation (0.69). There seemed to be a very small loss of reliability (mean reliability for TOPS 2 and TOPS 2S competition scale were 0.86 and 0.83, respectively; the mean reliability for TOPS 2 and TOPS 2S practice scale were 0.81 and 0.78, respectively). Hence, the TOPS 2 short form satisfied the criteria. Even though there is a slight loss of reliability with the short form when compared to the long form, in relation to the MTMM analysis based on the TOPS 2 long and short forms, there is good support for convergent and discriminant validity (see Marsh et al., 2010). Thus, the trade-off in savings of time (in administration, especially as a supplement to multiple instruments) is acceptable in relation to the marginal loss of reliability and validity.

(d) Short form must retain the factor structure of the original form. The CFA results indicated a good to adequate fit for the 17 factor TOPS 2 and TOPS 2S. The confirmatory factor analyses separately examined the competition and practice scales in accordance with previous TOPS studies (see Hardy et al., 2010; Lane et al., 2004). The analysis of the 17-factor structure of both the TOPS 2 and TOPS 2S provided a good fit for the model. The fit for the nine-factor competition scales was good for both the TOPS 2 and the short form. The eight-factor practice scales for both the TOPS 2 and the short form did not show as good fit as the competition scales but was adequate and acceptable.

Limitations and Directions for Further Research

Hardy and colleagues (2010) identified several limitations in the TOPS 2 that are applicable to the TOPS 2S. Firstly, they stated that the automaticity factor of the TOPS 2 presented with a new problem, which was that the reliability estimate and factor loadings indicated a need to re-examine and perhaps to replace the last item on this subscale. Another limitation that Hardy and colleagues stated was that there could be a possibility of conceptual overlap between self-talk and negative thinking subscales and recommended resolving this for future development of the TOPS 2.

In addition to these limitations stated by Hardy and colleagues (2010), Lane and colleagues (2004) had also identified limitations of the original TOPS that were not addressed in the TOPS 2; that the weaker loadings for some subscales indicated that the participants may not have comprehended the meaning of the items. They believed that the language may be more suited for adult populations rather than adolescents. Even though these concerns were identified before developing the short form, they could not be addressed in this study since the TOPS 2S needed to retain the content and breadth of the TOPS 2. Future study or refinement of the TOPS measure could perhaps also explore Lane's (2007) recommendation that meaningfulness of the items should be examined via a qualitative study, and he also suggested that participants should find these items interesting. Lane and colleagues (2004) also suggested that items with lower factor loading should be reworded for clarity.

One key limitation of this study that is the focus on internal validity evidence. In other words, it seems appropriate to examine the correlations with indicators external to the TOPS tool to see if anything is lost or gained via the short form.

The length of the TOPS 2S may itself be a limiting factor. A fifty-one-item short form compared to the 68-item long-form may "not be that short". The rationale for the short form is that it saves administration time as a trade-off for validity (Smith et al., 2000). Even though the trade-off was not addressed directly, it could be questioned whether a nine-item reduction of the long form is a worthwhile justification, compromising validity in saving little administration time. In this researcher's view, the multiple administrations of the instrument would add up the saving time to be of significant gain.

Conclusion

It was the intention of the present study to develop an even shorter instrument in light of the other measures that were used with the TOPS 2S for the present researcher's major research study. However, this was complicated due to the TOPS 2 structure, with competition and practice scales having seventeen factors and four items designated to each one. It was important to retain the same TOPS 2 structure and, thus, all 17 factors to maintain its reliability and validity. The range of items retained was able to maintain the breadth and depth of each factor. The CFA results indicated that the TOPS 2S had maintained high reliability and the construct validity. Moreover, the TOPS 2S factors related to the established and cognate TOPS 2 constructs. Finally, a strong and robust 51-item TOPS 2S, retaining all the qualities of its original form, was developed with appropriate rigor (Marsh et al., 2010), without the methodological sins in short form development that were described by Smith and colleagues (2000).

Chapter Summary

The Test of Performance Strategies (TOPS 2; Hardy, Roberts, Thomas, & Murphy, 2010) may be perceived as too long, especially when used in conjunction with a battery of other instruments. Therefore, the purpose of this study was to develop a robust, reliable, and valid short form of this instrument.

The recommended criteria (see Marsh et al., 2010) were applied in selection of items for the TOPS 2 short form (TOPS 2S). A minimum of three items per factor was recommended by Kline (2005) and Marsh and colleagues (2010), which the present study adopted. Confirmatory Factor Analysis and ESEM was conducted with Mplus using maximum likelihood estimation to investigate the factor structure of the TOPS 2 and the TOPS 2S. The results showed that the TOPS 2 and TOPS 2S reliability estimates were consistently high for all factors. The overall alpha for the TOPS 2 (0.95) was marginally higher than the TOPS 2S (0.94). The CFA and ESEM showed that the confirmatory fit indices met the cut off in the criteria advocated by Hu and Bentler (1999). The Multitrait-multimethod (MTMM) analysis showed that the TOPS 2S had met the criteria for convergent and discriminant validity. It is also demonstrated here that the ESEM indicated a better model fit and can be used in psychometric tests of psychological assessment instruments.

It is anticipated that the refinement of the TOPS 2 will help reduce administration time (especially when supplemented with other questionnaires) and further encourage researchers to use this measure in their applied research. Moreover, applied researchers may find the TOPS 2S a practical replacement for the TOPS 2, and information obtained through this instrument can enable them to plan, build, and implement future psychological skills programs for their athletes.

CHAPTER 5

A Practical Model for Coaches to use Mental Strategies to Enhance Psychological Strengths for Athletes: Coaches as Trainers

Introduction

Literature on mental skills training and psychological constructs was presented in Chapter 2 in the Literature Review section. A brief additional overview relevant to this section of the intervention is presented here.

Coaches play an important role in disseminating mental strategies to their players. Their knowledge of mental skills and ability to incorporate them into players' training environment can largely determine the success of an intervention. Even when the coaches are not directly implementing the program, their support and knowledge could enhance the development and sustainability of the program and can improve its effectiveness (Freitas, 2012). Freitas and colleagues' (2013) systematic review of 28 studies on mental skills training in football showed that the coaches lacked essential skills to integrate mental strategies into their normal training. In his investigative research study, Freitas (2012) interviewed 13 elite Portuguese Premier Soccer League coaches and found that even though they acknowledged the importance of the use of mental strategies in football, coaches were unprepared for its implementation into their training program. The main reasons given by the coaches were lack of time and lack of scientific knowledge (Freitas, 2012).

Freitas and colleagues' (2013) review also interestingly noted that football players were the focus of the most researchers, and very little attention was given to the coaches. Even though football players are the central players in almost all football field research, coaches also exert significant influence as they endorse and implement the psychological programs (Freitas et al., 2013). Coaches can also benefit from these programs and apply the skills for their own personal and professional needs, including coping with the many pressures that come with coaching and managing football teams. Freitas and colleagues (2013) recommended targeting coaches in addition to the football players when implementing such interventions.

Coaches' ability to provide essential social support to athletes and the ability to deal with crises are important factors that can influence athletes' performance (Gould, Damarjian, & Medbery, 1999; Gould, Greenleaf, Chung, & Guinan, 2002). They are also required to successfully manage their own performance and organisational stressors to be able to provide quality support for their athletes (Thelwell, Weston, & Greenlees, 2010). Mental strategies can be a very useful tool not only for the players, but also the coaches, to manage their emotions both on and off the field. In their study, Thelwell and colleagues (2010) reported that football coaches employed emotion focused strategies such as verbal and physical strategies to cope with poor performances.

Brief Overview of Multicomponent Training Package for the Current Intervention Study

Evidence suggests efficacy of football performance because of multicomponent mental skills training programs (Papaioannou, Ballon, Theodorakis, & Auwelle, 2004; Slimani et al., 2016; Thelwell et al., 2006; Thelwell et al., 2010). Mental skills training has evolved over the last few years and is becoming more sophisticated, with continued interest due to increasing demand in the current professional environment (Freitas et al., 2013). With the vast knowledge and information currently available, there is ample opportunity for athletes and coaches to pick and choose programs that meet their needs.

Even though many psychological training models employ and utilise principles that enhance personal development and life skills, few researchers have previously studied or explored this aspect of the program (Gould, Collins, Lauer, & Chung, 2007). Recently, researchers are showing some interest in coaches' philosophies for guiding coaching practice (Gould, Pierce, Cowburn, & Driska, 2017). The current multicomponent model endeavoured to take into consideration the cultural perspective to reflect the values of coaches and players. Emphasis was also given to the life skills and personal development of players, as well as that of coaches. Further exploration was undertaken to examine the effects of mental skills on self-concept, flow, life effectiveness, and mental toughness as possible desirable psychological strengths constructs.

This current research framework resonates well with Vealey (2007), who advocated a complex, multilayer, and integrative approach to mental skills training (Freitas et al., 2013). Vealey’s (2007) model depicts foundation, performance, team skills, and personal development as the four major targets of psychological training. The process shows the integrative approach to developing mental skills, which is largely based on the coach/consultant’s philosophy that determines the model type employed in the program. The coaches’ familiarity with the techniques and strategies will also determine the model chosen for their program and its effectiveness. It was anticipated that the current intervention in the training environment would encourage both the coaches and footballers to utilize the strategies and skills learned, not only specifically for football performance, but also for their general well-being.

The Purpose of the Current Study

The purpose of this study was to test the intervention effects on use of mental skills, how the use of mental skills affects psychological strengths outcomes (mental toughness, self-concept, flow, and life effectiveness), and football performance, via quantitative and qualitative approaches. The research utilised a mixed methods approach to also examine whether the train the trainer model could be adopted for effective delivery of mental strategies to the players during their football training. Therefore, it was prudent to solicit coaches’ perception on the delivery and players’ use of mental strategies via a semi-structured interview.

General Methodology

Mixed Method

A mixed method research approach has great potential for addressing complex research problems (Plano Clark, 2017). It provides higher perspectives and greater insights on previously unexplored research problems (Hobby, 2014) by combining quantitative and qualitative research methods to counteract respective weaknesses of one or another method (Plano Clark, 2017; Tashakkori & Teddlie, 2010). Greater confidence can be attained if findings are corroborated across different methods (White, Olson, Parker, Astell-Burt, & Lonsdale, 2018), and where there are conflicting findings, the researcher then has greater knowledge to interpret and make conclusions accordingly (Johnson & Onwuegbuzie, 2004).

Social scientists have called for mixed methods for generality and particularity where results also portrayed contextual stories about lived experiences (Greene, 2008). The three key dimensions of mixed designs include the degree to which the different methods are designed and implemented, the dominance of one or the equality of methodologies, and the timing of the implementation (Greene, 2008). The current investigation combined suitable practices of mixed methods to best investigate the effectiveness of the mental skills intervention program.

Three Parts of the Intervention Investigation

Three synergistic studies (Parts A-C) were conducted to investigate the intervention effects of a multicomponent mental skills training program on mental skills use, psychological strengths outcomes, and football performance. Both quantitative and qualitative approaches were utilised for this intervention study. The quantitative methodology was the main focus and forms the basis of analysis for Part A and B of this chapter. The two methods were conceptualised, designed and implemented collaboratively.

The short form of Test of Performance Strategies (TOPS 2S), developed and presented in Chapter 4, was utilised for the quantitative approach to collect data during the intervention and is presented in Part A and B of this study. The qualitative approach, with semi structured questions, was adopted to examine coaches' perceptions to the delivery and effectiveness of mental strategies. Part C presents the qualitative aspects of the mental skills intervention. It was appropriate to present the qualitative and quantitative results separately for greater clarity. The separate parts fit together and give a coherent data gathering, analysis, and interpretation. This research was conducted in Fiji.

Study 3, Part A: Psychometrics of the TOPS 2 S with Fiji Data

The Test of Performance Strategies short form (TOPS2S) presented with strong psychometric properties (discussed in Study 1, Chapter 4) and can be used in research as a tool to examine and predict important practice and competition behaviours. Nevertheless, concerns have been expressed, particularly about its application with adolescents (Lane et al., 2004) which has been found to be confusing for adolescent respondents. If there were concerns on the English language comprehension of some of the constructs with English speaking adolescents, it would be reasonable to assume that this could be a significant concern in cross-cultural settings. Therefore, it is important to further investigate TOPS 2S psychometrics to examine in cross-cultural settings such as Fiji.

The Purpose

The question of general judgment and probity of measurement instruments such as the TOPS 2S can be determined by two key elements, validity and reliability. Moreover, the integrity of the data collected needed to be evaluated. The purpose of Part A, therefore, was to examine the psychometric properties of the TOPS 2S with the Fiji data in the hope that it maintained rectitude with the newly developed TOPS 2S.

Statement of Hypotheses

The research hypotheses in Part A were based on the relevant intervention study data generated through the use of the TOPS 2S, the short form.

Hypothesis 5.1:1. Tests of reliability of the scores for each subscale will be acceptable, with alpha coefficients close to 0.70 or above.

Hypothesis 5.1:2. The TOPS2 short form factor structure will demonstrate acceptable model fit.

Method

Sample

The analysis was based on the combined data from two intervention waves and further data collected from another high school in Fiji.

1. In 2015, TOPS 2S instrument data were obtained from 15 secondary schools in Fiji as part of two waves of the intervention study on mental skills training conducted over five weeks. These data were from a sample of 385 participants (composed of males with mean age = 16.5) from school football teams.
2. Further TOPS 2S instrument data were obtained from a top-ranking secondary school in Fiji in 2017. This data was from a sample of 342 participants (composed of females and males with mean age = 16.5).

Instrument

The TOPS 2S is a short form of the TOPS 2 self-report questionnaire that was detailed in Chapter 4. It retained three-items and 17 factors from the TOPS 2, with eight practice and nine competition skills (subscales). See Appendix P.

Statistical Analysis

Missing data. With regard to missing data, 51% of the participants stayed across the two waves. The missing data was largely due to participants' absence from school and withdrawal from the intervention program. Missing data is pervasive in quantitative research studies (Baraldi & Enders, 2010). Baraldi and Enders (2010) stated that maximum likelihood is a common method employed by researchers to address missing data where parameter values with the highest probability of producing the sample data are identified using all available data. This method is advantageous to traditional methods as it requires less stringent assumptions and alleviates the pitfalls of traditional techniques (Baraldi and Enders, 2010). Full Information Maximum Likelihood (FIML) procedure was used to handle missing data. This model-based approach to handling missing data is unbiased under the missing at random (MAR) assumption and retains statistical power as no observations are deleted. (Baraldi and Enders, 2010). FIML is considered superior to traditional missing data treatment methods such as listwise deletion as it requires less stringent assumptions and alleviate the pitfalls of traditional techniques (Baraldi and Enders, 2010). Therefore because of these advantages FIML was used here.

Analysis

The reverse coded items were subjected to additional scrutiny for this research study, as there seemed to be incorrect or confused responses to the measuring items. Results, therefore, presented in this section were obtained with and without negatively worded items (Table 12).

Adopting the advice from my principal supervisor, Professor Marsh (personal communication, November 11, 2018; also see Marsh & Scales, 2018), multiple waves (Wave 1 and Wave 2 in Sample 1) and multiple sets (Sample 1 and Sample 2) of data were stacked (combined) to obtain stronger results. Stacking data is appropriate when conducting reliability and structural validity analyses since it increases the sample size and statistical power. Factor analysis was conducted based on 467 participants' data completed for the TOPS 2S both at Wave 1 and Wave 2 as part of the intervention, and an additional 342 participants responded to the questionnaires later (see sample above). By stacking the data, we obtained *N* = total responses.

For this analysis format, maximum likelihood estimation with complex design option in Mplus (version 7.11) was used to adjust errors since there were two sets of responses from the participants and one set from different participants. The CFA was conducted to investigate the factor structure of the TOPS 2S using the Fiji data and to compare it with the factor structure of the TOPS 2S developed in Study 2. ESEM did not converge for this data analysis and therefore only CFA analysis was included.

Participant responses did not seem to differentiate between the practice and competition subscales, and this was also scrutinised in the statistical analyses. Thus, 13 correlated residuals between parallel worded items in competition and practice scales were included in the analysis.

Results

Confirmatory factor analysis (CFA) of the TOPS2S for the Fiji data

The full model (including both competition and practice subscales) only fit the data marginally well, as indicated by the root mean square error of approximation (RMSEA= 0.03), the comparative fit index (CFI= 0.91), and the Tucker- Lewis Index (TLI= 0.89). Note that correlated uniquenesses were included to account for parallel worded items from competition and practice subscales (see Appendix Q for list of parallel worded items). Comparatively, the full model (on sample data presented in Chapter 4) showed slightly better fit to the TOPS 2S than that based on the Fiji data. The lack of adequate model fit was due to the low factor loadings of negatively worded items (i.e., <0.30). The reliability analysis also showed that the subscales containing negatively worded items had low coefficient-alpha estimates of reliability such as Attention Control and Emotional Control in both the competition and practice categories (0.602 and 0.506 for competition, 0.466 and 0.605 for practice, respectively), and Negative Thinking (0.385) in the competition category. These findings indicate that the non-English speaking background participants here did not grasp the TOPS 2S concepts very well when items were negatively worded (see below for further discussion). Not surprisingly, the fit indices, however, improved significantly when analysis excluded the negatively worded items (RMSEA = 0.03; CFI = 0.95; and TLI = 0.95). As such, negatively worded items were excluded in subsequent analyses.

The CFA results showed very high correlations between corresponding scales in competition and practice (e.g., CG-PG = 0.980 and CI-PI = 0.986), possibly signifying lack of understanding or confusing items as measuring the same thing, which prompted further data analysis (see Appendix R- Correlation matrix of TOPS 2S). Therefore, the 7-factor model that combined practice and competition ratings was used for the analysis. Hence, Confirmatory Factor Analysis was then conducted by combining corresponding scales in competition and practice into one factor. Again, the correlated uniquenesses were included to account for parallel worded items from competition and practice subscales. The combined CFA model showed RMSEA = 0.04; CFI = 0.87; and TLI = 0.86, while the same with negatively worded items removed showed a better fit with RMSEA = 0.02; CFI = 0.95; and TLI = 0.95. In relation to factor loadings, the combined CFA showed significant factor loadings ranging from 0.480 to 0.704 for all seven combined factors (see Table 13). Furthermore, the correlations among the combined corresponding practice and competition scales ranged from 0.689 to 0.957 (see Table 14). In addition, all combined factors provided acceptable reliability (range = 0.651-0.794).

Table 12

Confirmatory Factor Analysis of TOPS 2S when Applying Stacked Data

	With Negatively worded items			Without Negatively worded items			Parallel- with Negatively worded items	Parallel-without Negatively worded items
Fit Indices	All factors	Comp	Prac	All factors	Comp	Prac	Combined factors	Combined factors
Chi-square	2878.87	1682.01	899.32	1393.46	458.64	899.32	3813	1529
Df	1049	288	224	731	181	224	1173	776
RMSEA	.03	.06	.04	.03	.31	.03	.04	.02
CFI	.91	.88	.92	.96	.97	.97	.87	.95
TLI	.89	.85	.91	.95	.96	.96	.86	.95

Note: Stacked Fiji data = data collected in Fiji during intervention study, Fiji-Parallel = Fiji data with parallel (correlated uniquenesses were included) worded items, All factors = 17 factors of Competition and Practice, Comp = Competition, Prac = Practice, df = Degrees of Freedom RMSEA = Root Mean Square Error of Approximation, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, Combined factors = Competition and practice items combined.

Table 13

Factor Loadings when Applying Stacked Data Based on Combined Practice and Competition Subscales without Negatively Worded Items

Practice			Competition		
	Questions	Fiji		Questions	Fiji
Goal setting	1	.598	Goal setting	6	.577
	19	.660		13	.632
	24	.625		22	.665
Imagery	3	.506	Imagery	17	.528
	8	.523		25	.558
	20	.571		27	.591
Attention Control			Attention Control	38	.535
	12	.480		48	.603
	21	.628			
Self-talk	2	.495	Self-talk	16	.539
	11	.563		18	.627
	23	.599		26	.606
Activation	32	.590	Activation	34	.575
	41	.547		39	.640
	51	.595		44	.609
Automaticity	14	.550	Automaticity	42	.504
	33	.511		46	.551
	45	.608		47	.638
Relaxation	5	.582	Relaxation	31	.647
	10	.560		40	.704
	36	.651		43	.574

Table 14

CFA Correlation Matrix when Applying Stacked Data for the TOPS 2S Based on Combined Practice and Competition Subscales

	CG	CI	CST	CA	CAC	CAU	CR
CG	1						
CI	0.840	1					
CST	0.874	0.957	1				
CA	0.826	0.859	0.870	1			
CAC	0.881	0.852	0.879	0.900	1		
CAU	0.739	0.810	0.812	0.913	0.801	1	
CR	0.689	0.769	0.808	0.788	0.767	0.780	1

Note: CG = Goal Setting, CI = imagery, CST = Self-talk, Ca = Activation, CAC = Attention Control, CAU = Automaticity, CR = Relaxation

Study 3 Part B: The Intervention Effect- a Quantitative Component

Introduction

The overarching purpose of this thesis was to examine the effects of mental skills training on the use of goal setting, self-talk, imagery, and relaxation. We examined when, where, and why the football players used these strategies. We also examined intervention effects on the psychological strengths of mental toughness, self-concept, life effectiveness, and flow. It was envisaged that mental skills training would enhance the use of mental strategies, which, in turn, could have positive effects on the psychological strengths.

The intervention adopted the train the trainer model, whereby coaches were trained to implement the program. This is a widely acclaimed, successful training model (Orfaly et al., 2005). A substantial benefit of this model is that the training program can be sustained on a long-term basis (Orfaly et al., 2005). The training program would also be made stronger by employing the trainers that are known to the community (Orfaly et al., 2005). In the current study, coaches were the trainers. They had a stronger connectivity with their players (students), and, thus, utilised this established trust and credibility. Coaches in this instance were provided with training and given instructions and program guidelines so that they could give specific training to the football players.

A battery of instruments, including the TOPS 2S, Mental Toughness Inventory (MTI), Elite Athlete Self-Description Questionnaire (EASDQ), Flow Trait Scale (FSS), and Life Effectiveness Questionnaire (LEQ-H) were utilised to seek responses from the football players to assess the effects of the mental skills intervention on use of mental strategies (Part B1) and the psychological constructs (Part B2). The psychometrics of the TOPS 2S on the Fiji data were presented earlier in Part A of this chapter.

Study 3 Part B1: Intervention Effect on Mental Skills

Purpose

The purpose of Part B1 of the intervention study was to evaluate the effects of mental skills training on athletes' use of mental strategies. The results would also indirectly give an inclination as to the coaches' ability to implement psychological skills training program to their players. This intervention was not registered.

Statement of Hypotheses

Hypothesis 5.2.1. There would be an increase in athletes' use of mental skills due to the intervention.

Hypothesis 5.2.2. Coaches would be able to successfully implement a structured mental skills training program in their normal training program.

Method

Participants

The data for this component of the intervention study were collected from 429 students from Grades seven through twelve in 15 secondary schools in Fiji. The participants were from the schools' football teams playing national inter-secondary school competition in the under 15, under 17, and under 19 categories. At the time of this research, schools in Fiji had only boys' football teams and, therefore, only males were involved in this study. All 25 teachers who coached and managed the school football teams from these 15 schools volunteered for the program. The schools were randomly assigned to experimental and wait-in-list control groups. Eight schools with 13 teachers were assigned to the intervention group, while seven schools with 12 teachers were assigned to the wait-in-list control group.

A priori power analysis was conducted, indicating that to achieve power with .80 for detecting a modest effect size (ie. $d = 0.4$) based on $p = 0.05$ needs a total sample of $N = 200$

with equal group size. The sample size for the current intervention was substantially bigger than the estimation.

Procedure

Ethics approval (HREC NO: 2014 87N) was obtained from Australian Catholic University prior to commencing the study. Approval was also obtained from the Fiji Ministry of Education, who then notified all schools in Fiji on the research proposal. For logistical purposes, the researcher then directly contacted the schools only in the western region of Fiji to volunteer for the program. The connections made with the Director of Secondary Education in Fiji greatly expedited the researcher's entry into the schools. Eklund (1993) suggested considerations must be given to connections, courtesy, knowledge, and researchers' personal attributes to not only gain entry to research settings but to overcome various forms of resistance. The researcher's knowledge and connections in Fiji, having taught in secondary schools and assisted National Football Team coaches in Fiji, helped him gain acceptance and develop rapport within the schools. This association with Fiji was instrumental in the researcher obtaining cooperation from all school coaches.

Once the school had volunteered, the school coaches were contacted at the schools and the intervention process (see Appendix T) was explained to them. Participation information letters were given to coaches, parents, and guardians of all students taking part in this intervention. Coaches and parents/guardians of students taking part in the intervention program also completed consent forms. After the consent was obtained, 15 secondary schools that volunteered to take part in the intervention program were randomly allocated into two groups, seven in the experimental and eight in the wait-list control group.

School coaches in the experimental group were then trained in the delivery of the five-week intervention program (Appendix T). The experiential education (Roberts, 2012) workshop was designed for the coaches so that they could experience these skills for themselves. Experiential education promotes direct experience of learning by doing, and is a powerful technique (Glazier & Bean, 2018; Roberts, 2012). It was to help the coaches get the maximum benefits of the workshop with the limited timeframe available for the program curriculum (see Appendix T).

The intervention. The researcher conducted a four-hour workshop to educate and upskill the coaches on the mental strategies and to prepare them for implementation of the program at their schools for their football teams. The wait-list control group were upskilled in week five after the collection of the second wave of data. The intervention workshop was conducted at the Fiji Football Association academy.

Program structure. Four one-hour sessions were conducted to cover each mental skill from the multicomponent package. Relaxation was conducted first. This was followed by mental imagery, self-talk and goal setting. The program was structured so each session included: (a) an overview, a short lecture that introduced and described the mental skill; (b) the researcher demonstrated and gave step by step break down of the skill; (c) the coaches applied and practiced the skill; (d) feedback and discussion of coaches' experience; and (e) discussion on how coaches could implement the mental skill in their football training program (See Appendix T for detailed program schedule). The instructions were short and simple, so the coaches could replicate during their football training. Having learned the process and techniques of the mental skills, coaches would be able to easily modify the instructions to suit their players.

Coaches from the experimental groups then implemented the program in their schools. Coaches would firstly teach their players each single mental skill and encourage multicomponent approach once enough proficiency level is achieved for the individual techniques. These coaches were recommended to introduce the mental skills program in closed settings, such as in classrooms and away from distractions. However, the follow-up sessions of the program were to be administered directly on the training field. The players would be encouraged to practice these mental skills during their football training, at competition games, and at home.

Coaches were supported throughout the program whereby (a) all coaches were given a program script (Appendix T) as a guideline to implement the program; (b) the researcher made himself available to the coaches whenever possible by means of phone, Skype, or in-person for the duration of the intervention; (c) at five weeks into the intervention, final data was collected.

Researchers (Damschroder et al., 2009; Lau, Wandersman, & Pate, 2016; Smith, Daunic, &Taylor, 2007) have recommended monitoring the research to enhance the accuracy and consistency of the intervention. It was not feasible to monitor the intervention study and carry out a fidelity check due to the limited access to the coaches. However, the researcher was told by the coaches that they had implemented the intervention, and this was evaluated in relation to qualitative interviews with the coaches (see Chapter 5 Part C) following the intervention.

Instrumentation

TOPS 2S. The TOPS 2S questionnaire was developed and utilised to explore the effects of mental skills on the use of these strategies by players in competition and practice (also see Appendix P for the questionnaire). Unlike some studies (Hagan, Pollmann, & Schack, 2017) that used only relevant factors (such as goal setting, self-talk, relaxation, and imagery) from the TOPS, the current study utilised the full TOPS 2S questionnaire (with 17 factors) to examine the psychometrics of the newly developed short form and also to investigate the effectiveness of the mental skills training. Hence, even though only four most common strategies of goal setting, self-talk, relaxation, and imagery were utilized for the current workshop, other strategies from the TOPS 2S were also reported. However, the follow-up discussions were mainly on these four skills.

Data Analysis

The validity of the TOPS 2S measurement instrument was tested in Part A of this chapter. As discussed previously in Part A, the competition and practice scales had very high correlation and, therefore, corresponding matching scales were combined. Since there was no corresponding Negative Thinking subscale in the practice and competition scales, it was not included in this regression analysis. The negatively worded items were removed for the intervention effect analysis due to the reasons discussed in the previous section.

The SEM using Mplus 7 (Muthén & Muthén, 1998-2015) was conducted to measure the use of mental skills from Wave 1 to Wave 2. These two SEM models are presented below on use of mental strategies for the matching combined factors. Model 1 included all participants from Wave 1 (including those that did not complete the program), whereas Model 2 included only those participants who completed both Wave 1 and Wave 2. In this respect, Model 1 is more conservative, but is likely to be negatively biased in relation to the effects for those who completed the program, whereas Model 2 might be argued to better represent the effects of the program. The juxtaposition between the two provides an indication as to whether missing data is a critical issue. The regression coefficient, β, of the dummy variables (i.e., intervention/control groups) represented the standardized mean differences and could be interpreted as effect size (Hedges, 2007). Full information maximum likelihood (FIML) estimation was used to handle missing data.

Results

Structural Equation Models of Intervention Effects

The descriptive results for corresponding combined subscales (corresponding factors; for example, imagery for practice and competition were combined as one factor) are presented in Table 15 below (also see Appendices V and W for the descriptive statistics for separate competition and practice subscales). Results from the SEM models for each combined TOPS 2S subscale are presented in Figure 3 below.

Intervention Effects of Players' Use of Mental Skills

Both Model 1 and 2's results showed significant intervention effects of mental skills training on players' use of the strategies. In Model 1, goal setting ($\beta = 0.26$, SE = 0.12, $p <$ 0.05, attention control ($\beta = 0.57$, SE = 0.16, $p < 0.05$), self-talk ($\beta = 0.27$, SE = 0.13, $p < 0.05$) and relaxation ($\beta = 0.31$, SE = 0.14, $p < 0.05$) were significant. The intervention effect on imagery was marginally significant ($\beta = 0.27$, SE = 0.15, $p < 0.10$). A similar pattern of findings was obtained for Model 2. The significant positive effects for corresponding strategies remained strong. This model also indicated the same set of strategies that had significant intervention effects on players: goal setting ($\beta = 0.26$, SE = 0.12, $p < 0.05$), attention control ($\beta = 0.25$, SE = 0.14, $p < 0.05$), self-talk ($\beta = 0.26$, SE = 0.13, $p < 0.05$), and relaxation ($\beta = 0.30$, SE = 0.13, $p < 0.05$). There were marginally significant intervention effects on imagery ($\beta = 0.25$, SE = 0.14, $p < 0.10$).

Table 15

Descriptive Information for Combined Factor Means for Mental Skills

Combined scales	Sample	M1	SD1	M2	SD2	Sample	M1	SD1	M2	SD2
Goal-setting	Experimental	3.845	1.015	3.875	0.815	Control	3.78	0.83	3.66	0.78
Imagery	Experimental	3.705	0.96	3.725	0.82	Control	3.62	0.77	3.53	0.755
Attention Control	Experimental	3.6	0.745	3.575	0.65	Control	3.435	0.775	3.34	0.68
Self-talk	Experimental	3.82	0.925	3.81	0.75	Control	3.695	0.84	3.625	0.77
Activation	Experimental	3.785	0.575	3.755	0.91	Control	3.75	0.77	3.725	0.77
Emotional Control	Experimental	3.09	0.655	2.98	0.69	Control	3.04	0.72	2.975	0.67
Automaticity	Experimental	3.64	0.925	3.695	0.945	Control	3.555	0.815	3.62	0.78
Relaxation	Experimental	3.43	0.96	3.705	0.85	Control	3.15	0.865	3.34	0.895

Note: M1 = model 1 mean; SD1 = model 1 standard deviation; M2 = model 2 mean; SD 2 = model 2 standard deviation

Model 1 T1T2-T1 Stay

Model 2 T1T2 Complete

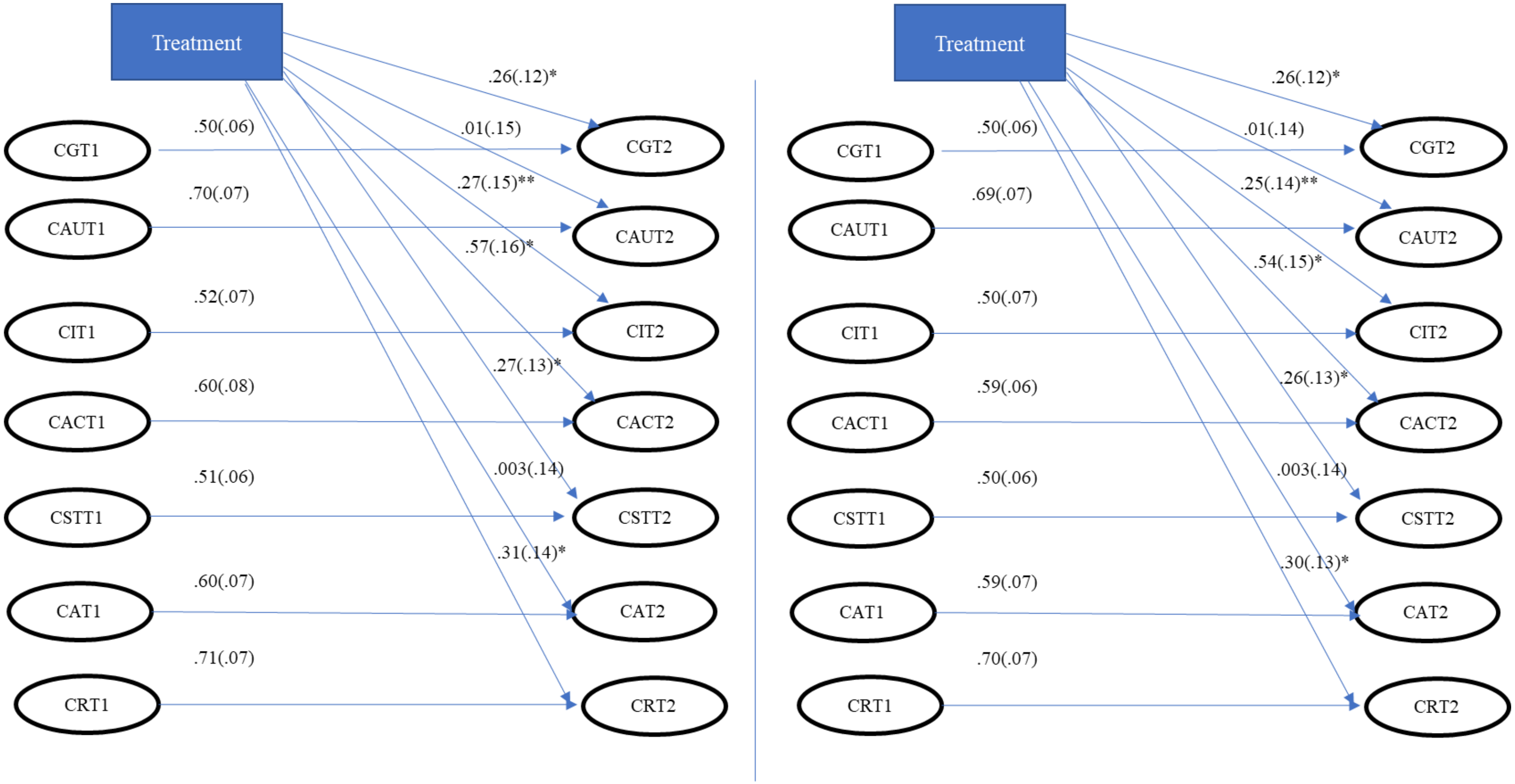

Figure 3. Results from regression analysis on combined factors.
Note. * = *p*< 0.05; ** = *p*< 0.10; T1= Time 1; T2 = Time 2

Overall, there were only marginal differences between the effect sizes in the corresponding strategies in both models (See Figure 3 for full SEM results). Activation and automaticity did not show any significant intervention effect in either model.

Study 3 Part B2: Psychometrics and Intervention Effect on Psychological Strengths: Mental Toughness, Self-Concept, Flow, and Life Effectiveness

Purpose

To evaluate the effects of the structured mental skills training on athletes' psychological strengths: mental toughness, self-concept, flow, and life effectiveness.

Statement of Hypotheses

Hypothesis 5.2.1. The players' psychological strengths of self-concept, mental toughness, life effectiveness, and flow will be enhanced through the positive effect of intervention on the mental skills (See Figure 4 for a conceptual model).

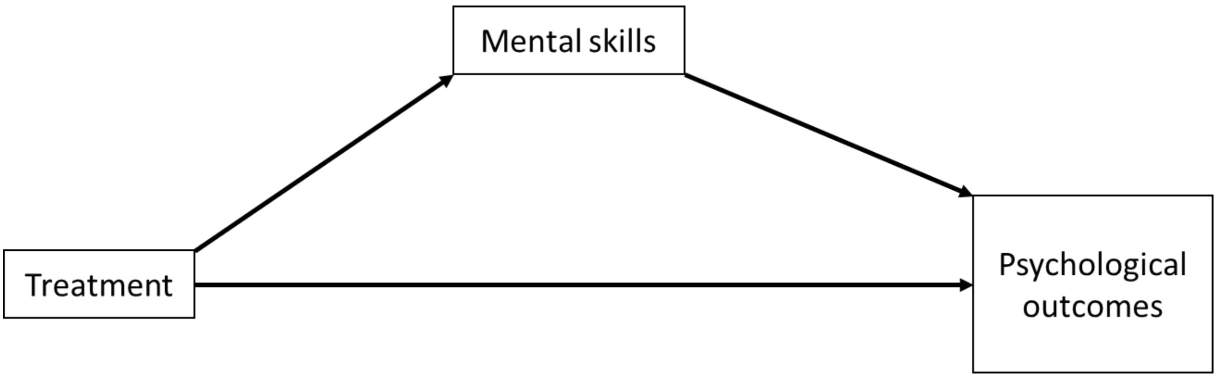

Figure 4. The mediating role of MST intervention on the relations between mental skills and psychological strengths

Method

Participants and Procedure

The data collected from the participants in Study 3 Part B1 was utilised here. The same procedure as in Study 3 Part B1 was used for this section.

Instrumentation

The final test battery included the TOPS 2S and selected factors from the Elite Athlete Self-Description Questionnaire (EASDQ), Mental Toughness Inventory (MTI), Flow Trait Scale (FSS), and Life Effectiveness Questionnaire (LEQ-H). Some factors from mental toughness, self-concept and life effectiveness seemed to measure similar concepts and were excluded. This was to further shorten the administration time and avoid unnecessary measurement of similar factors. Below is a brief statement on the purpose of using the instruments (also see Appendix P for the questionnaire).

TOPS 2S. This is the short TOPS 2 version described earlier in Part B1 above.

Mental toughness Inventory (MTI). The MTI is a 36-item, self-report test and assesses these characteristics of mental toughness: potential, self-efficacy, mental self-concept, value, task familiarity, perseverance, personal bests, task focus, goal commitment, positivity, stress minimisation, and positive comparisons, with one global mental toughness factor (Middleton, 2007; Middleton et al., 2004a). Middleton (2007) developed and tested the MTI as a component of his doctorate (PhD) using SEM, which produced an excellent model fit (CFI = 0.99, NNFI = 0.99, RMSEA = 0.050). Reliability estimates were found to be good, with alphas ranging from 0.89 to 0.96 and with a mean of 0.93. Choosakul and Julavanichpong (2018) examined the structural relationship of the MTI on athletes' success in Thai contact sports and found that the instrument had good model fit (CFI = 0.98, TLI = 0.98, RMSEA = 0.069). Cowden (2018) further carried out the factorial validity examination of the MTI in a cross-cultural setting and stated that their findings further provided psychometric support for the instrument.

The 36-item MTI would have been too long when included with the battery assessment for the intervention and, therefore, five factors, each with three items: goal commitment, stress minimization, mental self-concept, task focus, and perseverance were selected from this instrument. The responses were to be made on an eight-point Likert scale ranging from 1(“False- not like me”) to 8 (“True-like me”).

Elite Athlete Self-Description Questionnaire (EASDQ). The EASDQ was used to examine the effect of the program on players’ self-concept. Based on the multidimensional and hierarchical structure, the EASDQ was designed specifically for use with adolescents aged 12-18 years (Middleton, 2007). It is a 28-item self-report instrument designed to measure six interrelated components of elite athletes’ skills, self-concept, body, anaerobic, aerobic, mental, and overall performance (Jowett & Rhind, 2007; Marsh et al., 1997; Middleton, 2007). All scales have an acceptable level of reliability of at least 0.80, with a mean of 0.85 and well-defined factor structure evidenced by CFA (Jackson et al., 2001; Marsh & Perry, 2005). Three factors, skill, mental self-concept, and overall performance were selected from the EASDQ. Skill and overall performance contained five-items, whereas mental self-concept had four-items. The responses to the items were given on a six-point Likert response scale from 1 (False) to 6 (true).

Flow Trait Scale (FSS). The FSS was used to examine the extent to which the players perceived experiencing flow when participating in their favourite sporting activity. The FSS is a short form of a 36-item scale, the Dispositional Flow Scale (DFS), designed to assess flow experiences in general activities, as well as specific events (Jackson, Martin, & Eklund, 2008). It provides a brief measure of the nine-dimensional construct of flow (Jackson et al., 2008) and is suitable for situations where there are time constraints to utilising the long versions. All nine factors of the FSS, challenge-skill balance, loss of self-conscious, clear goals, action awareness, concentration on task, sense of control, unambiguous feedback, time transformation, and autotelic experience contained one item per factor; they were included in the measurement to capture an aggregate profile of flow characteristics (Jackson et al., 2008). The responses to the items were given on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Because of the nature of the construction of this measure, we treated it as a formative factor rather than a reflective factor (for further discussion see Bollen & Lennox, 1991; Edwards & Bagozzi, 2000) that provided a composite index constructed from independent, albeit correlated indicators. In the formative factor structure, the causal flow (the direction of the arrows in the path diagram) is from indicators to the composite construct. For formative constructs, unidimensionality and internal consistency are inappropriate – even counter-productive –criteria for assessing a formative measure. For this reason, we treat the FSS as a total score composite. For formative factors, it is also reasonable to consider each component separately, although use of single-item indicators provides a weak measure of each of the nine flow components.

Life Effectiveness Questionnaire (LEQ-H). The Life Effectiveness Questionnaire (LEQ) is a widely accepted and appropriate self-report questionnaire developed by Hattie, Marsh, Neill, and Richards (1997) to measure individual effectiveness for a range of important life skills (Freeman, 2017; Neill, 2008). It is sensitive to measuring changes in experience-based interventions in areas of personal and social development (Neill, 2008). It measures the effectiveness of people in accomplishing their wishes and desires (Neill, 2008). The LEQ-H is a revised version of the LEQ-G with 24 items and eight factors. The responses to the items were given on an eight-point Likert response scale from 1 (Not at all true) to 8 (Very true). It has good internal and acceptable test-retest internal consistency of 0.85 and reliability of 0.75 (Neill, 2008). The LEQ-H has shown a robust measurement model, with a global factor structure that is replicable across males and females and across age groups and goodness of fit indices, TLI = 0.98 (Neill, 2008). The LEQ-H can be used for investigating the effects of life skill intervention programs (Neill, 2008).

Both the LEQ-G and LEH-G were deemed too long when implemented with the battery of assessment tools for this intervention and, therefore, the four most relevant factors were selected from the LEQ-H and included in the final questionnaire. These factors included emotional control, social competence, active initiative, and intellectual flexibility. Each factor contained three-items.

Data Analysis

The validity of instruments i.e., the MTI, EASDQ, FSS, and LEQ-H) were also examined. Selected factors from these instruments relevant to the present study were identified and utilised in the survey. The SEM using Mplus 7 (Muthén & Muthén, 1998-2015) was conducted to examine the intervention effects on psychological outcomes such as mental toughness, flow, self-concept, and life effectiveness through different mental skills (see Figure 4 above). To avoid the multicollinearity issue, we tested the mediation model for each mental skill separately. A mediation model establishes the temporal dynamics of predictors, mechanisms (i.e., mediators), and outcomes (Garn, Morin, Lonsdale, 2019; Tod, Hardy & Oliver, 2011). In Part B1 we found similar results in relation to the effects of intervention on mental skills across two models with different patterns of missing data. As such, in this section, we tested the mediation effects based on the model where all participants from Wave 1 were included.

Results

Reliability

Reliability estimates of the psychological constructs of self-concept, mental toughness, life effectiveness, and flow are presented in Table 16 below. The preliminary analysis showed good reliability for all self-concept (α: mean = 0.825; range = 0.787 to 0.853), mental toughness (α: mean = 0.799; range = 0.779 to 0.816), and life effectiveness (α: mean = 0.809; range = 0.795 to 0.823) factors. For completeness' sake, we also include the reliability of flow, although this is not entirely appropriate for a formative measure.

CFA of the Psychological Strengths

EASDQ. The fit for the EASDQ scales of skill (five-item factor), mental self-concept (four-item factor), and overall performance (five-item factor) showed good model fit with $\chi 2$ (105) = 11939.00; RMSEA = 0.07; CFI = 0.96; and TLI = 0.95. The EASDQ fit index RMSEA showed reasonable fit, while CFI and TLI indicated excellent support for the model.

MTI. The fit for the MTI scales (all with three items per factor), goal commitment, mental self-concept, stress minimization, task focus, and perseverance, showed good model fit with $\chi 2$ (80) = 227.58; RMSEA = 0.04; CFI = 0.99; and TLI = 0.98. The MTI fit indices RMSEA, CFI, and TLI indicated excellent support for the model.

LEQ-H. The fit for the LEQ-H scales (all with three items per factor), intellectual flexibility, social competence, active initiative, and emotional control, showed good model fit with $\chi 2$ (48) = 189.11; RMSEA = 0.05; CFI = 0.98; and TLI = 0.97. The LEQ-H fit indices RMSEA, CFI, and TLI indicated excellent support for the model.

Factor Loading for Psychological Strengths Constructs

Factor loadings for the present study were all significant at $p<0.001$ and are presented in Table 17 below. Factor loadings of 0.70 and over indicate excellent loadings.

The ranges for three self-concept factors with a total of 14 items were from 0.520-0.707 and two items were above 0.70. The factor loading range for five mental toughness factors with a total of 15 items were from 0.634- 0.795, with nine items above 0.70. The factor loading range for four life effectiveness factors, with a total of 12 items, were from 0.651- 0.789, with eight items above 0.70.

Table 16

Reliability Coefficients Based on Selected Factors of Psychological Strengths Constructs: Mental Toughness, Self-Concept, Life Effectiveness, and Flow

Psychological Strengths	A
Self-Concept	
Skill	.835
Mental Self-Concept.	.787
Overall Performance	.853.
Mental Toughness	
Goal Commitment	.803
Stress Minimization	.809
Mental Self-concept	.816
Task Focus	.789
Perseverance	.779
Life Effectiveness	
Social Competence	.798
Intellectual Flexibility	.823
Emotional Control	.795
Active Initiative	.820
Flow	.884

Table 17

Fiji Data Factor Loadings for Psychological Strengths Subscales

Self-Concept	**Items**	**Factor Loading**	**Life Effectiveness**	**Items**	**Factor Loading**
Skill	1	.707	Social Competence	1	.789
	2	.646		5	.758
	3	.718		9	.705
	4	.648	Intellectual Flexibility	2	.707
	5	.629		6	.729
Mental Self Concept	6	.520		10	.699
	7	.662	Emotional Control	3	.660
	8	.684		7	.763
	9	.616		11	.650
Overall Performance	10	.655	Active Initiative	4	.651-
	11	.646		8	.753
	12	.697		12	.756
	13	.652			
	14	.649			
Mental Toughness					
Goal commitment	1	.671			
	6	.735			
	11	.686			
Stress Minimization	2	.643			
	7	.683			
	12	.795			
Mental Self-concept	5	.705			
	10	.794			
	15	.723			
Task Focus	3	.634			
	8	.742			
	13	.759			
Perseverance	4	.699			
	9	.738			
	14	.750			

T1= Time 1; T2 = Time 2

Treatment Effects on Psychological Outcomes via Mental Skills

The total effects are largely small and nonsignificant, but that this does not rule out the possibility of mediation. Results for the direct, indirect, and total effect of the intervention on psychological strengths outcomes of mental toughness, self-concept, flow, and life effectiveness are presented in Table 18.

Self-concept outcome. The self-concept construct included three factors, skill, mental self-concept, and overall performance. Total effects of the intervention were nonsignificant for all three self-concept scales (Table 18). However, there were significantly positive mediating effects (labelled IND = indirect effects in Table 18) on these factors and were found through relaxation (M = 0.15, range = 0.12-0.16), goal setting (M = 0.16, range = 0.15-0.17), and attention control (M = 0.38, range = 0.36-0.42). Mediated effects through self-talk, imagery, automaticity, and activation were nonsignificant. The direct and total effects on all the three self-concept factors were largely nonsignificant. Moreover, the direct effect predominantly indicated a negative relationship with use of mental skills. However, in the case of goal setting, relaxation, and attention control, the positive mediated effects were partially offset by negative but not significant direct effects, resulting in nonsignificant total effects (see Table 18).

Life effectiveness. The life effectiveness construct included these factors: social competence, intellectual flexibility, emotional control, and active initiative. Total effects of the intervention were nonsignificant for all four life effectiveness scales (Table 18). However, relaxation (M = 0.16, range = 0.14 -0.18), goal setting (M = 0.19, range = 0.12 -0.34), and attention control (M = 0.39, range = 0.34 -0.42) indicated the significantly mediated treatment effect on these life effectiveness constructs. Mediated effects through self-talk, imagery, automaticity, and activation were largely nonsignificant. The direct and total effects on life effectiveness factors were largely not significant. However, like the self-concept results, goal setting, relaxation and attention control, the positive mediated effects were partially offset by negative direct effects, resulting in nonsignificant total effects (see Table 18).

Mental toughness. The mental toughness construct included five factors: goal commitment, stress minimization, mental self-concept, task focus, and perseverance. Total effects of the intervention were nonsignificant for all three mental toughness scales (Table 18). However, there were significantly positive mediating effects (labelled IND = indirect effects in Table 18) on these factors found through relaxation (*M* = 0.17, range = 0.15-0.19), goal setting (*M* = 0.17, range = 0.14-0.21), and attention control (*M* = 0.46, range = 0.31-0.73). Mediated effects through self-talk, imagery, automaticity, and activation were nonsignificant. The direct and total effects on all mental toughness factors were nonsignificant. Similarly, the positive mediated effects through mental skills were partially offset by negative direct effects resulting in nonsignificant total effects on mental toughness (see Table 18).

Flow. Flow had single item factors, and therefore an overall mean and range of the mediation effects for all nine factors of challenge-skill balance, loss of self-consciousness, clear goal, autotelic experience, concentration of control, unambiguous feedback, time transformation, and action awareness, were obtained (*M* = 0.29, range = 0.17-0.38). Four out of 63 combinations of flow factor and skill had direct effect: concentration on task-relaxation [-0.28(0.13)], concentration on task-attention control [-0.31(0.15)], unambiguous feedback-attention control [-0.36(0.15)], and challenge-skill balance-activation [-0.27(0.12)]. A lone flow component, challenge-skill balance, which measured the balance between the challenges of a situation and one’s skills, produced a total intervention effect for goal setting [0.27(0.13)], attention control [0.28(0.13)], activation [0.28(0.13)], and self-talk [0.28(0.13)] (See Table 19). The players’ response to this item possibly showed that they believed that they were operating at a high level, or just right level, of skill to be able to cope with the challenges of the situation (Jackson & Marsh, 1996).

Table 18

Direct, Indirect and Total Effect of Intervention on Psychological Strengths: Mental Toughness, Self-Concept, and Life Effectiveness

	via CR			via CG			via CAC			via CA		
Factor	DIR	IND	TOT	DIR	IND	TOT	DIR	IND	TOT	DIR	IND	TOT
Self-Concept												
ESC	-.20(.14)	.16(.08)*	-.04(.14)	-.16(.13)	.17(.09)*	.01(.13)	-.32(.16)*	.38(.14)*	.06(.14)	.02(.13)	.14(.07)	.15(.15)
EMSC	-.03(.13)	.16(.08)*	.13(.13)	-.13(.11)	.15(.08)*	.02(.12)	-.29(.14)*	.36(.13)*	.07(.12)	.01(.11)	.01(.07)	.02(.12)
EOP	-.08(.12)	.12(.07)	.05(.12)	-.09(.12)	.15(.08)*	.07(.12)	-.27(.15)*	.42(.14)*	.14(.13)	.08(.12)	.002(.09)	.09(.13)
Life Effectiveness												
LAI	-.16(.12)	.14(.07)*	-.02(.12)	-.15(.11)	.12(.06)*	-.03(.11)	-.39(.16)*	.41(.15)*	.02(.12)	-.03(.11)	.01(.07)	-.02(.12)
LEC	-.10(.13)	.17(.08)*	.06(.14)	-.10(.12)	.16(.08)*	.06(.13)	-.27(.15)	.40(.14)*	.13(.13)	.06(.12)	.004(.09)	.06(.13)
LIF	-.18(.14)	.18(.08)*	-.01(.14)	-.15(.13)	.16(.08)*	.01(.13)	-.36(.16)*	.42(.14)*	.06(.14)	-.01(.12)	.01(.06)	.003(.14)
LSC	-.08(.12)	.14(.07)*	.05(.13)	-.23(.15)	.34(.13)*	.11(.12)	-.23(.16)	.34(.13)*	.11(.12)	.09(.12)	.01(.07)	.10(.12)
Mental Toughness												
MGC	-.27(.14)*	.19(.09)*	-.08(.14)	-.26(.13)*	.21(.10)*	-.05(.14)	-.50(.17)*	.51(.17)*	.01(.14)	-.06(.12)	.001(.10)	-.06(14)
MMSC	-.01(.13)	.15(.08)*	.14(.13)	-.003(.12)	.15(.07)*	.14(.12)	-.13(.14)	.31(.12)*	.18(.13)	.16(.12)	.001(06)	.16(.13)
MP	-.30(.15)	.18(.09)*	-.12(.16)	-.31(.15)	.21(.10)	-.11(.15)	-.65(.33)	.73(.36)*	.08(.59)	-.13(.14)	-.001(.12)	-.13(.16)
MSM	-.26(.12)*	.15(.08)*	-.11(.13)	-.18(.13)	.14(.08)	-.04(.13)	-.30(.15)	.32(.12)*	.02(.87)	-.01(.12)	-.019.09)	-.02(.13)
MTF	-.26(.12)	.16(.08)*	-.07(.13)	-.19(.12)	.14(.07)*	-.05(.12)	-.42(.15)*	.45(.15)*	.04(.13)	-.03(.12)	.01(.08)	-.03(.13)

Note * = *p*< .05; DIR = Direct effect of treatment; IND = Indirect effect of treatment; TOT = Total effect of the treatment. CR = Relaxation, CG = Goal setting, CAC = Attention Control, CA = Activation. ESC = Skill-Self-concept; EMSC = Mental Self-concept; EOP = Overall Performance; LAI = Active Initiative; LEC= Emotional Control; LIF =Intellectual Flexibility; LSC = Social Competence; MGC = Goal Commitment; MMSC = Mental Self-concept; MP = Perseverance; MSM = Stress Minimization; MTF = Task Focus

Table 18

Direct, Indirect and Total Effect of Intervention on Psychological Strengths: Mental Toughness, Self-Concept, and Life Effectiveness (cont'd)

	via CST			via CI			via CAU		
Factor	DIR	IND	TOT	DIR	IND	TOT	DIR	IND	TOT
Self-Concept									
ESC	-.16(.13)	.20(.10)	.04(.13)	-.15(.13)	.18(.10)	.03(.13)	-.01(.13)	.004(.07)	-.01(.14)
EMSC	-.12(.11)	.16(.08)*	.04(.12)	-.16(.11)	.19(.10)	.03(.12)	-.06(.12)	.01(.08)	-.05(.12)
EOP	-.05(.12)	.18(.10)	.14(.27)	-.06(.12)	.18(.10)	.12(.13)	.01(.13)	.01(.09)	.02(.14)
Life Effectiveness									
LAI	-.16(.11)	.14(.08)	-.01(.12)	-.15(.11)	.14(.08)	-.01(.12)	-.07(.11)	.01(.08)	-.06(.12)
LEC	-.06(.13)	.15(.08)	.09(.13)	-.08(.12)	.12(.07)	.05(.13)	-.02(.13)	.01(.08)	-.01(.14)
LIF	-.13(.13)	.16(.08)*	.03(.13)	-.15(.13)	.15(.08)	-.002(.13)	-.23(.14)	.02(.08)	-.01(.14)
LSC	-.09(.12)	.18(.09)*	.09(.12)	-.08(.12)	.15(.08)	.07(.12)	.02(.12)	.02(.09)	.03(.12)
Mental Toughness									
MGC	-.23(.13)	.20(.10)*	-.03(.14)	-.24(.13)	.19(.12)	-.04(.14)	-.14(.13)	.01(.09)	-.13(.14)
MMSC	.01(.13)	.18(.09)	.18(.13)	-.002(.12)	.16(.09)	.16(.13)	.11(.12)	.01(.08)	.12(.13)
MP	-.28(.15)	.26(.13)*	-.03(.15)	-.28(.15)	.22(.13)	-.06(.16)	-.22(.15)	.01(.11)	-.21(.16)
MSM	-.15(.13)	.13(.08)	-.02(.13)	.19(.12)	.15(.09)	-.04(.13)	-.09(.12)	.00(.07)	-.09(.13)
MTF	-.18(.12)	.18(.09)	.01(.12)	-.19(.12)	.16(.09)	-.03(.13)	-.11(.12)	.01(.07)	1.11(.13)

Note * = *p*< .05; DIR = Direct effect of treatment; IND = Indirect effect of treatment; TOT = Total effect of the treatment. CST = Self-talk, CI = Imagery, CAU = Automaticity; ESC = Skill-Self-concept; EMSC = Mental Self-concept; EOP = Overall Performance; LAI = Active Initiative; LEC= Emotional Control; LIF =Intellectual Flexibility; LSC = Social Competence; MGC = Goal Commitment; MMSC = Mental Self-concept; MP = Perseverance; MSM = Stress Minimization; MTF = Task Focus.

Table 19

Direct, Indirect, and Total Effect of Intervention on Flow

	via CR			via CG			via CAC			via CA		
Flow Factor	DIR	IND	TOT	DIR	IND	TOT	DIR	IND	TOT	DIR	IND	TOT
F1	.07(.12)	.14(.07)*	.21(.13)	.12(.12)	.15(.07)*	.27(.13)*	-.03(.15)	.32(.12)*	.28(.13)*	.27(.12)*	.01(.08)	.28(.13)*
F2	-.18(.12)	.15(.07)*	-.04(.13)	-.07(.12)	.10(.05)	,03(,12)	-.19(.14)	.29(.11)*	.10(.13)	.06(.12)	.001(.06)	.06(.12)
F3	-.15(.13)	.10(.06)	-.04(.13)	-.03(.13)	.10(.06)	.06(.13)	-.20(.14)	.31(.12)*	.11(.13)	.05(.12)	-.001(.03)	.05(.13)
F4	-.09(.13)	.14(.07)*	.05(.14)	-.07(.13)	.17(.08)*	.09(.13)	-.25(.16)	.38(.14)*	.13(.14)	.09(.12)	.00(.09)	.09(.13)
F5	-.28(.13)*	.09(.05)	-.19(.13)	-.17(.13)	.07(.05)	-.11(.13)	-.31(.15)*	.26(.11)*	-.05(.13)	-.11(.12)	-.001(.04)	-.11(.13)
F6	.03(.13)	.12(.06)	.14(.13)	.06(.13)	.12(.06)	.18(.12)	-.17(.15)	.36(.13)*	.19(.13)	.16(.12)	.003(.06)	.16(.13)
F7	-.29(.14)	.09(.05)	-.20(.14)	-.20(.13)	.09(.05)	-.11(.13)	-.36(.15)*	.26(.11)*	-.09(.13)	-.16(.12)	.01(.06)	-.15(.13)
F8	-.08(.13)	.09(.05)	.01(.13)	.007(.12)	.10(.05)	.10(.12)	-.15(.14)	.30(.11)*	.15(.12)	.11(.12)	.003(.06)	.11(.120
F9	-.19(.13)	.15(.08)	-.04(.14)	-.09(.13)	.11(.06)	.02(.13)	-.15(.15)	.17(.09)	.02(.13)	-.04(.13)	.004(.06)	-.04(.13)

Note * = *p*< .05; DIR = Direct effect of treatment; IND = Indirect effect of treatment; TOT = Total effect of the treatment. CR = Relaxation, CG = Goal setting, CAC = Attention Control, CA = Activation. Flow factors: F1 = Challenge-Skill Balance; F2 = Loss of Self-Conscious; F3 = Clear Goals; F4 = Action Awareness; F5 =Concentration on Task; F6 = Sense of Control; F7 = Unambiguous feedback; F8 = Time Transformation; F9 = Autotelic Experience.

Table 19

Direct, Indirect and Total effect of Intervention on Flow (cont'd)

	via CST			via CI			via CAU		
Flow Factor	DIR	IND	TOT	DIR	IND	TOT	DIR	IND	TOT
F1	.13(.12)	.15(.08)	.28(.13)*	-.05(.12)	.09(.06)	.04(.13)	.22(.12)	.01(.09)	.23(.13)
F2	-.03(.12)	.00(.06)	-.03(.14)	-.04(.13)	.07(.05)	.03(.13)	.02(.12)	.007(.06)	.02(.13)
F3	-.03(.13)	.10(.06)	.07(.13)	-.-5(.13)	.14(.08)	.09(.13)	-.04(.13)	.004(.48)	-.04(.13)
F4	-.02(.13)	.09(.07)	.08(.15)	-.19(.13)	.06(.04)	-.13(.13)	.03(.13)	.003(.09)	.03(.14)
F5	-.20(.13)	.10(.06)	-.10(.13)	.05(.13)	.11(.07)	.17(.13)	-.17(.13)	.00(.04)	-.17(.13)
F6	.02(.13)	.15(.08)	.17(.13)	-.25(.13)	.10(.06)	-.15(.13)	.11(.12)	.01(.09)	.12(.13)
F7	-.24(.13)	.11(.06)	-.14(.13)	.02(.12)	.08(.05)	.10(.13)	-.20(.13)	.01(.06)	-.19(.13)
F8	.05(.12)	.09(.05)	.13(.12)	-.19(.13)	.13(.07)	-.06(.14)	.05(.12)	.01(.06)	.06(.13)
F9	-.15(.13)	.13(.07)	-.02(.14)	.12(.12)	.14(.08)	.26(.13)*	-.10(.13)	.01(.06)	-.01(.14)

Note * = $p < .05$; DIR = Direct effect of treatment; IND = Indirect effect of treatment; TOT = Total effect of the treatment. CST = Self-talk, CI = Imagery, CAU = Automaticity; Flow factors: F1 = Challenge-Skill Balance; F2 = Loss of Self-Conscious; F3 = Clear Goals; F4 = Action Awareness; F5 =Concentration on Task; F6 = Sense of Control; F7 = Unambiguous feedback; F8 = Time Transformation; F9 = Autotelic Experience

Practice and competition scales were combined for this analysis. CR = Relaxation, CG = Goal setting, CAC = Attention Control, CA = Activation, CST = Self-talk, CI = Imagery, CAU = Automaticity; ESC = Skill-Self-concept; EMSC = Mental Self-concept; EOP = Overall Performance; LAI = Active Initiative; LEC= Emotional Control; LIF =Intellectual Flexibility; LSC = Social Competence; MGC = Goal Commitment; MMSC = Mental Self-concept; MP = Perseverance; MSM = Stress Minimization; MTF = Task Focus, F1 = Challenge-Skill Balance; F2 = Loss of Self-Conscious; F3 = Clear Goals; F4 = Action Awareness; F5 =Concentration on Task; F6 = Sense of Control; F7 = Unambiguous feedback; F8 = Time Transformation; F9 = Autotelic Experience

Part C: Qualitative Analysis: Coaches' Perspectives

Introduction

The Role of Coaching

Athletes need a range of self-managing strategies to deal with the considerable stressors that they face that result from personal and professional matters (Gould & Maynard, 2009). Moreover, the athletes typically acquire these coping strategies by learning them first before they can use them in their lives. It is here that coaches have a significant role to play. Their ability to provide essential social support to athletes and teach them how to deal with crises is an important skill that can influence athletes' performance (Gould, Damarjian, & Medbery, 1999; Gould, Greenleaf, Chung, & Guinan, 2002).

In addition to providing assistance to their players, coaches are also required to successfully manage their own performance and response to organisational stressors in order to be able to provide quality support for their athletes (Thelwell, Weston, & Greenlees, 2010). For if they do not, their role as a coach would be surely compromised. In their study that looked at prominent stressors' coaches experienced, Thelwell and colleagues (2010) reported that football coaches employed mental strategies such as verbal and physical strategies to cope with poor performances. Mental strategies can be a very useful tool not only for the players, but also for the coaches to manage their emotions both on and off the field.

Purpose of This Component of the Intervention Study

The mental strategies program administered to the coaches in this research was an experiential learning process whereby the coaches themselves learned the strategies as they implemented them in their teams. Gould and colleagues (1999) encouraged more mental skills training for coaches so that they could become comfortable with the processes. The primary purpose of this study was to gain insight into coaches' implementation of the mental skills program and its effect on the football players. This was achieved using the qualitative methodology of thematic analysis.

Thematic analysis is a qualitative analytical method used widely in the social sciences (Camiré & Trudel, 2013; Thomas & Harden, 2008). A key advantage of this method was the absence of rigid rules, thus enabling researchers' greater freedom in identifying patterns of meaning in their data. This could be achieved through a systematic process comprising the following three stages: line by line text coding, developing descriptive themes, and generating analytical themes (Thomas & Harden, 2008).

Statement of Hypotheses

The qualitative component of the intervention carried the same hypothesis as stated for Study 3 Part B.

Method

Participants

All the coaches were asked to participate and only 11 coaches from different schools volunteered for the interview process (see Appendix X). They were all male secondary school teachers with ages ranging between 25 and 40. None of these coaches had played representative football, however they played recreational football for their local clubs. Their coaching experience ranges from 6-10 years (see Appendix X). These were from the same group of coaches who had conducted the intervention in their schools (complete methodology is presented in Part B of this chapter).

The school programs

The football season in schools runs for the whole second term, which is generally about 10 weeks. Most schools would have teams in three age categories, including under

15's, under 17's and under19's. The football teams comprise of 11 players that can take part in the game while 5 five additional reserve players also form the team structure and can be substituted during the game. English is the main language of communication; however Hindi and Fijian languages would also be used by the coaches and players.

Interviewing Schedule

Using an interview guide with five open-ended questions (Table 20), coaches were interviewed for understanding and exploring their perceptions on the intervention and how they had used it with their players. Interviews give researchers an insight into people who cannot be directly observed (Patton, 2002), and it was deemed ideal for this research, given that much of what coaches do, how they strategize, how they think, and how they manage stress, is not easily observable. The coaches were prompted for responses as to the effectiveness of the strategies they administered to their players. All interviews were carried out by the same researcher (VK) and conducted via telephone.

Table 20

Five Interview Questions

No.	Semi-structured interview questions
1	Did the Mental Skills Training workshop provide you with the competencies (knowledge/skills) you expected? Explain your response.
2	Do you think a structured Mental Skills Training program will have an influence on the footballers' use of mental skills? Why?
3	Can a structured MST enhance psychological strengths (such as mental toughness, self-concept, life effectiveness, and flow) in footballers? Explain your response.
4	From your experience, can you tell me how effective was the mental skills training program that you implemented with your football team?
5	How could the effectiveness of future MST be improved?

Thematic analysis

Overview

Thematic analysis is a qualitative technique for identifying patterns of meaning present in interview data (Attride-Stirling, 2001; O'Connor & Joffe, 2013). It is important to consider the theoretical framework used by the researcher when conducting a thematic analysis, as this influences all decisions made in the research process (Mertens, 1998). It is equally important to consider the paradigm to postulate the philosophical assumptions and methodologies that inform what will be found (Sparkes & Smith, 2013). This research component adopted a pragmatic approach that was concerned with coaches' personal experience in determining the effectiveness of the mental skills training program and, therefore, a constructionist paradigm was adopted (Braun & Clarke, 2006; Lapan, Quartaroli, & Riemer, 2012), as this framework aims to make sense of the themes generated by the individuals (Creswell, 2007).

Braun and Clarke (2006) suggested several features that were also considered for this study: **(a)** theme represents a patterned response and has some meaning within the data. Flexibility in interpreting the data needs to be maintained to allow different ways to determine themes and capture something important in relation to the research question; **(b)** main themes and subthemes were explored within the data that related to the area of interest; **(c)** a more explicitly analyst-driven approach was taken for the theoretical thematic analysis, since it provided more detailed analysis of many aspects of the data; and **(d)** thematic analysis here considered the sociocultural and structural conditions that catered to the individual themes and sub-themes.

Procedure

Thematic analysis of the interview data was performed manually. Braun and Clarke (2006) suggested the following six phases for thematic analysis, which were used for the current analysis: **(1)** verbatim account of the data was transcribed from the interview recordings and thoroughly familiarised through repeated reading. Meaning and patterns were searched for initial ideas and were noted down; **(2)** interesting initial ideas were extracted from the thorough systematic data search and coded. Codes identify interesting features of the data that can be analysed in a meaningful way (Braun & Clarke, 2006). Coding was carried out manually by highlighting all probable patterns with potential themes; **(3)** phase three searched for themes when all data had been coded and collated. Initially, tables were used to sort out the codes and to help identify themes and sub-themes (see Table 21). A number of significant themes were identified at this stage; **(4)** phase four was refinement of the themes and involved breaking down themes into different sub-themes or collapsing them into each other (Braun & Clarke, 2006). Here, identified themes were explored to examine the coherent patterns in relation to the entire data and also to see if it was the accurate representation of theoretical analytical approach; **(5)** further refinement of the themes was conducted to obtain a detailed analysis of each theme that would clearly define it and also capture the broader overall research questions; and **(6)** the final stage of the phases involved writing a report that told a story. Identifiable data extracts were used to verify themes within the data.

Trustworthiness of data. Thick description (Daftery & Craig, 2018: Korstjens & Moser, 2018; Reay, Zafar & Glaser, 2018) strategy was adopted to ensure the trustworthiness of the data for the current study. Thick description generates a depth of analysis that go beyond individual behaviours and include the context that shapes and informs the behaviours (Daftery & Craig, 2018). Semi-structured questions invite active listening and probing open-ended questioning generally offers a vivid picture of the participant’s personal experiences (Daftery & Craig, 2018). The researcher for the current study, asked questions that produced a wealth of information on the participants' experiences and perspectives, and the school environment in which those experiences were prevalent. The 7-10-minute interview lengths for the participants allowed the full complement of the necessary information for the analysis.

Results

Coaches enthusiastically discussed the effectiveness of the intervention and how it influenced and impacted the lives of the students both on and off the field. Quotations from the coaches' interviews provided the raw data that was subjected to a thematic analysis. The analysis yielded five themes and seven subthemes (Table 21). Main themes, subthemes and sample relative raw data from interviews are presented below.

Table 21

Thematic Analysis of Samples of Data from the Coaches' Interview Data

Main Theme	Sub Themes	Sample data extract	Number of coaches citing the theme
Use of mental strategies	Frequency of mental strategies used by students	They were really into it, plan to achieve it and then talk it over. setting off targets before the game, after the game during our national finals	11
Football Performance	Improves player performance	Upgraded skills, guided players, get a sense of game, improved performance, learned to concentrate, more focused and sharp, gives them faith, responds well to instructions, gives them hope	10
	Improve team performance	Helps the team, better team performance, won more games, performed better than established teams	10
Personal development	School performance	Used in classroom, skills help prepare for exams, students got better grades	6
	Helps self-regulation	Self- motivated, able to control anger, organise themselves better, gives mental stability to players	8
Competencies gained by the coaches	Self- regulation	Used for self- management, see life as more interesting and brighter, personal use	7
	Skills	upskill coaching technique, able to better control players, helps in coaching and teaching	8
Recommendations		Include MST in school curriculum, whole school approach, more trainers and more workshops, more time needed for better results	7

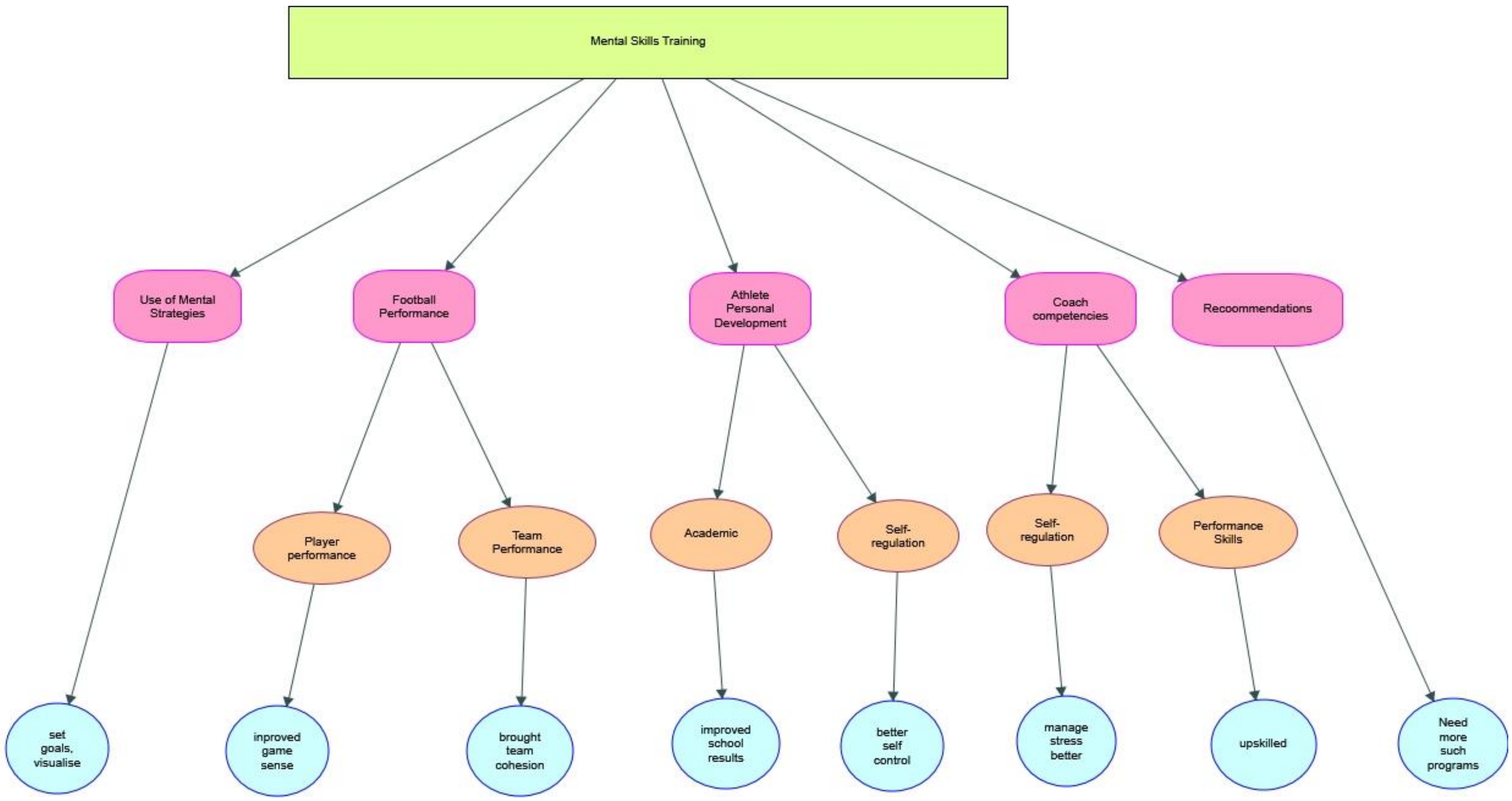

Figure 5. Mind-map of the themes, sub-themes, and identified data from the coaches' interviews.

Use of Mental Strategies

Ten of the 11 coaches reported that the mental skills training intervention had a positive influence on footballers' use of mental strategies while one coach mentioned that he had very little time to implement the program to get full effects of the program. This was due to his other school commitments. Generally, coaches mentioned that students used these strategies before, during, and after the games and during their training. Explanations with sample quotes are presented below.

Influence of MST on use of mental strategies by students. The coaches' quotes from the interview script showed that the students had learned and applied the mental skills strategies. One coach stated that his players practiced the mental skills both before and after the game. Another stated that players practiced the skills during training.

"The students were able to uplift their mental skillset towards their performance. They knew the importance of this program. Students are able to explore what the program was all about. They were immersed into it". (JT)

"...and then setting off targets before the game, after the game during our national finals". (MA)

"Even after finishing the game, we sat down again for another five minutes or so, you know, to just focus again. They sat down for their meditation program before the training started". (NN)

"Before matches, even during training time we used to make them sit and concentrate and tell them to visualise teams, all these things". (PV)

Football Performance Improved Sense of Game

All eleven coaches mentioned that the students' football performance improved as a result of exposure to the mental strategies implemented in their football training program. Coaches also iterated that the program improved both the individual, as well as the team, performance. The following raw data extracted from coaches show this view:

Individual performance. Coaches mentioned that the players benefited individually. Their football performance as well as off the field benefits, such as academic performance also improved.

"Program definitely helped soccer players to achieve what they couldn't achieve without this program". (AD)

"...helped in my progress for my kids. Really help students in the academic, and also in the field of sports". (JS)

"I have seen improvement with our soccer boys". It really worked well with my kids (JT)

"...managed to at least have some sense of the game". (NC)

Team performance. Coaches indicated that their mental skills training was effective in improving the overall team performance.

"Managed to qualify for the regional final with unknowns, we were again able to qualify for the national final, otherwise without this training we won't have been able to qualify". (AD)

"I was really happy I did teach my children a few techniques that you taught us and it gave us some good results as well". (MA)

“It really worked for our soccer team..under-15 development squad had a better result than some very qualified groups like very talented schools”. (PV)

“Even one goal down - we were in a similar situation this year but although we did not come out victorious we managed to have a one-one draw where the students were able to continue playing”. (RL)

“It also brings the cohesion in them. I could see improvement and the game. ” (SK)

Players’ Personal Development

School performance. All eleven coaches mentioned they also implemented this program in their classroom, in addition to the actual research intervention. They stated that the program positively impacted on other areas of students’ life, such as academic and emotion regulation. See below raw data extracts from the coaches verifying players’ personal development.

“This not only helps out in the ground but also in our classroom. Even they said that it has really worked well in the academic area” (SR)

“It has been very effective in nearly all the ways”. They've brought this idea into their academic work and in term three, ...they set up a target ...worked to it” (AD)

“Really help students in the academic” (JS)

“Improve their school results. It also makes a difference in your classroom. Even my school results, excellent results. If I have to give an example, our physics results; normally it was around 40, 50 per cent; this year it was 61”. (PV)

Self-regulation. Coaches commented that mental skills training improved player self-regulation. Players were able to better control their emotions, and subsequently this helped coaches in managing their players.

"They are able to control themselves". (NL)

"They said it gives them, you know, a set of mind peace I believe to focus more. They were able to organise themselves in their homes as well where they may have some conflict". (NN)

Coach Competencies

All coaches commented that they personally benefitted from implementing the intervention. They gained valuable skills and knowledge in performance enhancing strategies and also acquired self-regulation strategies to better manage themselves. Coaches are at times under enormous pressure and deal with many difficult situations. At times, coaches' personal resources may be insufficient to deal with coaching demands, and this can be exacerbated when dealt with over a significant period of time (Tashman, Tenenbaum, & Eklund, 2008).

Self-regulation. Coaches said they also benefited from mental skills training. They were able to apply these skills to help them with coaching as well as their teaching.

"Used for self- management, see life as more interesting and bright". (AD)

"We are under pressure now to destress ourselves and things like that really helped me in my coaching career as well as the teaching as well". (MA)

"Like when mentally trying to look after myself and helping myself it's really helped me with it". (NL)

"Personally it has helped to increase our strength, mental strength, and be more psychologically strong and now after the training we have gone through we will see a life more interesting and more bright". (NC)

Skills. *"Upskill coaching technique, able to better control players, helps in coaching and teaching". (AD)*

"I also acquired a certain level of skills by facilitating the program". (JT)

"Competencies, skills, knowledge, it provided a lot of information to me and then it helped in my progress". (JS)

"Upgraded on knowing a few more things which can help me in my coaching skills" learnt a few techniques I would say especially the one that requires you to and understand your students". (MA)

"Helping me actually how I control them". (NL)

"It was quite useful in terms of training my students in the playing field and

in the classroom". (NC)

Recommendations

Coaches made recommendations that could further improve this mental skills training program. Their recommendations were:

1. for more similar programs and broader roll-out of the program
2. mental strategies be incorporated into school curriculum at an earlier stage
3. to increase the length of the program to get maximum benefit
4. involve higher authorities such as the Fiji Ministry of Education in supporting the program in schools

"We need to start it at point early day from the primary school level. Include MST in school curriculum, whole school approach, more trainers and more workshops, more time needed for better results". (AD)

"You can lead more facilitators taking care of the small groups better

"One of the sessions, few sessions of it you can do". (JT)

"More facilitators taking care of the small groups better". (MA)

"*Have more training of the trainers". (NC)*

"If this can be implemented in the school system as well". (NC)

"*We need to have a continuous proactive training and the implementation part is very short". (NL)*

"If it comes, we can come through ministry.... if it comes from the authorities that we implement it then surely .. they should make some area, like room for these classes to be run". (PV)

"We need is more of your time probably". (RL)

"Maybe the time was a bit small too small, so if such programs can be a bigger timeframe". (SK)

"We would like to have more of these types of sports psychology programs… because this not only helps out in the ground but also in our classroom". (SR)

Discussion and Conclusion

Part A

The intervention study in Fiji provided the opportunity to investigate the robustness of the TOPS 2S in a cross-cultural context and, therefore, it was appropriate to examine its psychometric properties. The psychometric properties, such as reliability and factor structure, of TOPS 2S were thoroughly examined.

The reliability estimates (α) obtained for the TOPS 2S subscales in the present study were lower than those obtained with secondary data, presented earlier in Chapter 4. The main reason may be due to Fijian participants' lack of comprehension of TOPS abstract concepts and formulations, particularly for negatively worded items.

The CFA results in this study only indicated the marginally adequate fit for the 17 factor TOPS 2S. However, when negatively worded items were removed, the fit for the TOPS 2S nine factor competition and eight factor practice scales were substantially improved and more reasonable. This finding suggests that the negatively worded items included in the TOPS 2S did not perform as well as they did in the original TOPS2 (which was based on the fluently English-speaking sample). This observation may be consistent with other instruments incorporating negatively worded items (Morin & Maiano, 2011). Morin and Maiano (2011) stated that the negatively worded items could contribute to the bias in the measurement model. Negatively worded items, however, are generally included in measurement instruments to prevent careless responding (Podsakoff, Mackenzie, Lee, & Podsakoff, 2003). Morin and Maiano (2011) recommended that future studies should also include positively worded versions of the same items.

There were "question marks" in relation to some aspects of the factorial validity of the instrument and its use with fluently English-speaking adolescent athletes (Lane et al., 2004). Many have questioned the suitability of using the TOPS with adolescents and have stated that the language used in some items may be inappropriate for them (Lane et al., 2004). Adolescents also have more limited cognitive abilities, and it might be harder for them to distinguish abstract formulations (Morin & Maiano, 2011). This may have a more compounding effect when they are from non-English speaking backgrounds. It is envisaged that if TOPS 2S data collected from adolescents or adults with better comprehensive language, it would yield a better model fit and one which could be suitably used in a validation analysis. Also, a single study is insufficient to come to a clear conclusion on the psychometric properties of any instrument (Morin & Maiano, 2011).

The correlations reported in this study were very elevated (i.e. >0.89) between the same factors in practice and competition. Morin and Maiano (2011) explained that such inflated correlations observed with short forms attempt to cover a broad range of dimensions with few items and, therefore, the discriminant validity may be suboptimal. The high correlations may also indicate that participants did not differentiate between the use of mental skills training in practice or in competition. Combining the corresponding items indicated a more suitable model, at least in this cross-cultural setting. The nature of the sample could have contributed to the difference in validation results of the TOPS 2S. These tools may require ‘cultural adjustments’ to capture with authenticity the contextually salient aspects of the concepts. As such, further research is needed to fully evaluate the robustness of support for the TOPS 2S in English speaking, as well as non-English speaking, countries. There is also a need for additional validation with both English and non-English speaking adults, as well as adolescent samples.

Part B

This study investigated the effect of a five-week mental skills training program on the use of the multicomponent strategies of goal setting, imagery, self-talk, and relaxation among high school students in Fiji. The different approaches to handle the missing data (i.e., Models

1 & 2) led to highly similar patterns of results, indicating the robustness of our findings that showed that the multicomponent approach enabled players to use some strategies more than the others.

Effectiveness of mental strategies. The availability of different mental strategies in a multicomponent package allows greater freedom of choice for the players and could guarantee the success of the intervention approach. Given that there is a plethora of research evidence showing the effectiveness of the multicomponent mental skills training programs (Blakeslee & Goff, 2007; Horn et al., 2011), it was not surprising to see the positive effect of intervention for goal setting, self-talk, and relaxation strategies.

The marginally significant effect size from the results also showed that players seemed to have improved their use of imagery to some degree. In light of the findings in the meta-analysis presented in Chapter 3 of this thesis, it was anticipated that the intervention effect on imagery would be higher than reported above. Gould and colleagues (2014) explained that athletes not practicing the imagery would not achieve expected high results. It is necessary to spend quality time to practice any skill to get desired results. Gould and colleagues' reasoning may apply here, that the lower than anticipated scores could mean that the players did not practice imagery well enough. The intervention may have been too short, and they did not have enough time to learn and practice the skills when data was collected. Also, their preference could have been use of the other skills that they were exposed to by their coaches in the multicomponent package. Yet another reason could be that the players may have believed that they already had high levels of skills and there was very little room for improvement.

The meta-analysis presented in the current thesis also revealed that 22-42 days of intervention length had a large effect size, while shorter interventions of seven days and less had moderate effect sizes. In light of this meta-analysis finding, there was an expectation of moderate to large gains for the current intervention because the intervention length was 35 days. However, there were limitations to this intervention study (discussed at the end of Chapter 5 and Chapter 6) that would have contributed to the effectiveness of the training program. There were no manipulation checks to verify that, when, or which coaches were able to implement the intervention straight after the workshop. Due to the academic pressure on schools, coaches in Fiji schools also did not get full support from the school hierarchy. This may have contributed to the actual length of the Fijian intervention.

The overall findings, however, are consistent with previous literature (Garvin, 2014), including the meta-analysis presented in Chapter 3 of this thesis, which showed that the participants' application of mental strategies increased with structured mental skills training program. Evidently, results indicated that players became generally more skilled and increased the frequency of the use of mental strategies as they acquired knowledge and ability to perform these tasks from the coaches' implementation of the training program. Even though many studies (Feltz & Landers, 1983), including the meta-analysis presented in this thesis, have shown that shorter duration of mental skills intervention is more effective, novice athletes would require more time to learn not only the sport specific skills, but the mental strategies and may require longer intervention programs for greater effect. Horn and colleagues (2011) suggested that the intervention for novices needed to be longer than 10 weeks for effective outcomes for both practice and competition settings.

The overall findings from this study indicated the efficacy for mental skills intervention, thus providing good support for the widely accepted belief that the multicomponent approach produces maximum benefit for athletes (Vealey, 2007) when compared to the single skill interventions. The multicomponent package has a tendency for strategies to complement each other and could give athletes added advantage rather than being imposed with just a single skill. For example, visuo-motor behaviour rehearsal is a cognitive behaviour strategy that combines imagery with relaxation and gives an added advantage rather than using just the single skill (Cirimele, 2010).

Effectiveness of psychological strengths constructs. This section of the chapter began with a psychometric test of the EASDQ, MTI, FSS, and LEH-Q instruments, which were developed to measure elite athlete self-concept, mental toughness, life effectiveness, and flow. The recommended reliability estimates of 0.80 by Smith and colleagues (2000) was prevalent in the EASDQ and LEH-Q, while the accepted reliability of 0.70 was evident for the FSS and MTI. The psychological strengths instruments showed excellent model fit. The higher factor loadings for the EASDQ, MTI, and LEH-Q showed strong association of the underlying variables, and this further indicated that these variables appear to be reliable in cross-cultural studies (Marsh et al., 2014). The strong psychometric results can be suggestive that these instruments were well suited to the cross-cultural setting where participants were from non-English speaking backgrounds.

Mediation effects. It was hypothesized that the treatment on mental toughness, self-concept, life effectiveness, and flow would be mediated through the promotion of the use of mental strategies. The results supported this notion to some degree. The findings suggested that there was a significant mediation process linking the intervention, the use of mental strategies, and psychological outcomes. These findings are aligned with previous research showing that mental skills can influence self-concept (Marsh, 1998), mental toughness (Connaughton et al., 2008), flow (Jackson et al., 2001), and life effectiveness (Neill, 2008). However, these positive mediation effects were largely not transferred to the positive total intervention effects on psychological outcomes. This is due to the largely nonsignificant but negative direct effects, which counteracted the positive indirect effects, leading to nonsignificant total effects. In particular, a small number of flow factors obtained significant and negative direct effects. One explanation of this could be that before the intervention, the participants were overconfident and believed that they already had the above-mentioned characteristics of flow. However, after being exposed to the intervention program, they would have acquired some insight into the psychological concepts being tested and then corrected their responses accordingly. It could also be that the testing came too soon and, initially, the players were not able to grasp the psychological construct concepts. This explanation may work for all psychological strengths' outcomes (not just flow), although the direct effects were nonsignificant and negative. But it indeed cancelled out the positive indirect effect.

Self-perceptions are based on a combination of objective accomplishment and subjective frames of reference. Hence, even if objective accomplishments are stable (or positive), these can be offset by more demanding frames of reference against which accomplishments are evaluated (Marsh, 2007). Following this logic, the intervention not only improved mental skills, but also made participants aware that their mental skills had been weak compared to other peers. In this case, the direct effects of the intervention were largely nonsignificant (and sometimes significantly negative), which largely counteracted the significant and positive mediated effects through the mental skills. Overall, it indicates that the effects of the intervention of mental skills on psychological outcomes are weak.

Part C

The qualitative study was designed to examine the coaches' perceptions on the mental strategies they implemented for their school football players. The workshop tendered to the coaches seemed to have prepared them adequately to administer the intervention to their players. All the coaches interviewed mentioned delivering the mental strategies learned through the intervention workshop to their football teams. Coaches' ability to deal with crises and general social support is essential to give athletes assurance that they are well supported (Gould et al., 2002).

Coaches' perceptions. The results indicated that the train the trainer model had not only prepared the coaches but strengthened their self-efficacy as psychological skills trainers. Coaches showed that they were able to grasp the concept of mental skills training and ably teach mental skills that allowed the players to adequately prepare themselves for competitive performances. Conspicuously, coaches felt players were able to learn, refine, and practice mental skills as a tool to enhance football performance. Besides the performance benefits of mental strategies, coaches acknowledged personal benefits for both players and for them. The psychological constructs of mental toughness, self-concept, and flow did not get a mention from the coaches. Perhaps coaches were not familiar with these terminologies. With deliberately structured interview questions and follow up queries from coaches' responses, a better understanding of the mental skills use on these constructs could have been gained.

Mental skills use. The interview data collected from the coaches indicated players' emphasis given to use of mental skills as a performance enhancing strategy. Coaches did not make any distinction as to which strategy the players used most. There was good evidence of improvement in use of mental skills in the intervention effects study presented in Chapter 5B of this thesis, and this was reflected in coaches' interviews.

Frey and colleagues (2003) stated that athletes commonly use mental skills during competition rather than regularly at training. This was also evident here to some degree, as the coaches emphasised the players' use of mental strategies before competition. One coach, however, mentioned the use of these strategies at training and after the game. The more accurate indication of the use of mental skills at different settings would have come from players themselves.

Player's performance. All coaches commented that the use of mental strategies enhanced players' football performance. The findings here are consistent with previous findings (Freitas, 2012), including the meta-analysis results presented in Chapter 3 of this thesis, which found a positive relationship between mental skills use with improvement in sports performance. In light of the Chapter 5, Part B2 findings, these comments from the coaches validated that there was a mediating effect on sports performance due to the mental skills use (see Chapter 5, Part B2 results above). This study did not have any actual football performance measure. However, coaches' ratings were like school grades, and could perhaps be justifiably used as a performance measure here.

Other player benefits. Just participating in sports does not guarantee life skills development (Gould & Voelker, 2010), and other factors through sports experience, such as mental preparation and copying strategies, could play a part. An interesting current finding was the players' transference of these learned mental skills in other areas of their lives, namely in the classroom to improve their school performances. All the coaches interviewed gave a lot of importance of the mental strategies on not only players' sports performance, but also their school work and general well-being. The interview data showed that coaches also gave equal importance to effects of the mental skills on the benefits they personally experienced from the program.

It seemed that the coaches became aware of the personal benefits of the mental strategies that they had gained from the workshop, and consequently encouraged their players to apply the same strategies towards their academic work. Most coaches mentioned the improvements they noticed in their students' school behaviours and exam results. Furthermore, some coaches reported that they modified the mental strategies and made them suitable for the normal school classroom program to help other students with academic progress.

Train the trainer model. The workshop tendered to the coaches seemed to have prepared the coaches well to administer the intervention to their players. The results revealed that the coaches utilised the psychological strategies presented at the training workshop, and this was commensurate with the mental skills depicted in numerous studies (Diment, 2014; Koehn, Morris, & Watt, 2014; Kudlackova, Eccles, & Dieffenbach, 2013; Larsen & Engell, 2013; Ortega, Olmedilla, Palao, Sanz, & Bazaco, 2013; Zourbanos, Hatzigeorgiadis, Bardas, & Theodorakis, 2013). For example, the coaches reported that they trained their players to use self-talk, imagery, relaxation, and goal setting and, consequently, the players adopted them during their training and competition. This implication may well be regarded as good support for the hypothesis that coaches can be trained to successfully incorporate mental skills in their normal training program.

The train the trainer model seemed to have prepared the coaches to become more proficient at using mental skills, and they were able to appropriately use these skills at school football training. The coaches' work experience and educational background as teachers may have significantly contributed to their learning, assimilating, and accommodating the intervention strategies in their school. However, as mentioned previously, five weeks may not be enough to get all the desired results from such interventions (i.e., unclear if the length of this intervention was sufficient for its effectiveness on promoting mental toughness, self-concept, flow, and life effectiveness).

However, it was evident from the interviews that prior to the intervention workshops, these coaches in Fiji had very limited knowledge in mental strategies as a psychological tool for mental preparation for sports performance. Many of the coaches commented that this concept was new for them and recommended further courses and requested resources to help successfully deliver the program. Gould and colleagues' (1999) study found that even though the coaches cognitively understood the mental preparation concepts, they were not able to deliver such programs since they did not know how to conduct mental skill training drills and skills.

Gould and colleagues (1999) suggested that coaches will benefit from user-friendly mental skills information with concrete examples and activities that can be implemented easily. The workshop tendered to the coaches in the current intervention aligned with Gould and colleagues' (1999) suggestion. The coaches viewed the workshop program as easy to grasp and adaptable to the players' needs. It was evident that the multicomponent nature of the program also gave coaches ample strategies to choose from and tailored them to meet players' demands and requirements.

The train the trainer program was potentially a valuable tool and it maximised the benefits of mental strategies. They would not need to hire costly psychologists or consultants to run such programs for their players. Furthermore, school teachers coaching their school team had some advantages. Coaches incorporating such programs within their school had increased opportunities to practice delivery of training since they regularly had access to the players.

Coach benefits. Athletes are the primary reason for most sports psychologist engagement with a sports team/club; however, in addition, coaches can seek help for their own personal and professional assistance (Anderson, 2009) through these mental skills programs. The coaches' psychological and emotional needs were also addressed through this intervention. They were able to better manage their players and address their own well-being. Coaches reported that they used the mental strategies to regulate their own anxieties to withstand stress and pressure. Comments from coaches indicated that mental strategies could help settle coaches' pre-competition jitters.

Coaches need to fill this void and reach out for support in administering psychological preparation strategies for their teams, and for themselves. The results showed that coaches could be trained to deliver successful mental skills training program to their athletes in the training environment. It is imperative that the coaches acquire knowledge and skills on these psychological preparation strategies, as they are in regular contact with the players and will be able to consistently expose these players to the mental strategies for optimal performance.

The present study provided important insight into the mental skills training process and the coaches' review showed that that this program, while providing athletes' good psychological support, also gave much needed psychological preparation for coaches. There are increasing numbers of sports psychologists, but few directly work with the players/athletes (Gould et al., 1999). The researcher's personal knowledge about the football coach education in Fiji was that it does not give due recognition and importance to sports psychology. Notwithstanding lack of knowledge and skills, the coaches received the program with enthusiasm and found it beneficial not only to the players but to themselves as well.

Limitations: Parts A-C

A thorough planning and care should be taken so as not to repeat the pitfalls of the current methodological procedure, especially selecting appropriate measurement instruments that the players could comprehend. Effective intervention implementation could be promoted by embracing key recommendations from the Consolidated Framework for Advancing Implementation Research (Damschroder et al., 2009). Lau and colleagues (2016) further refined the Consolidated Framework for Advancing Implementation Research and suggested some key intervention characteristics for successful implementation: leadership motivation and engagement; available facilities and equipment; available, engaging staff; communication; goal setting; engaging youths; training; technical assistance; reflection and evaluation; provider knowledge and skills about the intervention; empirical evidence; adaptability; and parental support for the activity.

Parts A & B. The pre-intervention means from the TOPS 2S, EASDQ, MTI, LEQ-H, and FSS allowed little room to grow on all measures for all the schools. A possible reason for the high scoring could be erroneous, and also relates to the participants not being able to comprehend the items in the questionnaire, especially the TOPS 2S. English language as a limitation in cross-cultural settings had been discussed in Chapter 5, Part A above.

Furthermore, the results showed that participants were also not able to differentiate between the practice and the competition measures and, thus, overall responses for both conditions were closely matched. Another limitation could be that most coaches were not able to administer the intervention to give experimental group participants enough time to use the mental skills when data was collected. In addition, the school system did not have the full football training program in place for the mental strategies to be utilised effectively by the players at the time of the intervention. As stated in Part A, there was large number of missing data, possibly due to the participants' withdrawal from the program. Further investigation is necessary to conclusively determine the impact of mental skills training on the TOPS 2S, as well as the psychological constructs.

Part C. Despite making good connections and gaining trusts from the schools, very limited support was given by the Ministry of Education in conducting this study in Fiji. Schools had the directive from the Ministry of Education to improve students' academic marks and, therefore, minimal time was reserved for this intervention study. Lines of communication during the initial stages ((Eklund, 1993) with the Ministry of Education and the school hierarchy, would have favoured the researchers' ability to influence the schools' participation.

Furthermore, coaches overall made general statements about the effectiveness of the program rather than the specifics of it. For example, they stated that the players' performance improved because of the mental strategies they taught them. However, the information extracted from the coaches largely depended on the questions that were asked. Perhaps specific, semi-structured questions would have elicited more responses relating to the types and pattern of mental strategies employed by the coaches and players.

Another limitation was that the program may have been too short and did not allow the coaches and students to get a good impression of the effects of the mental strategies on psychological strengths. Pain and Harwood (2004) stated that lack of time is a barrier for the implementation of programs such as mental skills training within a sports environment. Evidently, this was likely the case here in the school environment.

The level of commitment of some coaches in an academic pressured environment could have affected their implementation of the program. The researcher was told that the Fiji Ministry of Education had directed the teachers to increase their schools/students’ overall raw scores and to perform well or they would lose their jobs. Coaches, fearful of losing their jobs, would have devoted more time to their students’ academic achievement at the expense of the football training time.

Another noticeable aspect of this intervention was that in the school system, successful implementation of the mental skills programs was dependent on the principal of the school. This was a limiting factor for the present study. The principal of the school needs to be supportive, since their directives are needed for the coaches in schools to conduct the programs. With their principals’ backing and directives, the coaches would have more freedom to carry out the intervention within the school premises. Also, support from other teachers from intervention schools are important factors for the success of the research study. Apparently, some coaches confided to the researcher that a few teachers in some schools were reluctant to let students out of their classes to be involved in this intervention.

Freitas (2012) stated that sometimes the coaches’ lack of commitment and belief in the psychological training can hinder the implementation of such programs. He suggested that an educational program that informs the coaches on the psychological and personal benefits of the program to both athletes and coaches may help coaches remove the negative impressions and further embrace psychological programs.

Future research in countries like Fiji would need to consider the principals' and school support for such interventions. It is also important to determine whether the English language and abstract concepts in the intervention were fully understood by the participants, specifically in cross-cultural settings (this was discussed extensively in Chapter 4).

Chapter Summary

This chapter presented three parts to the intervention study with the data collected from the football players and coaches in Fiji. Part A was a cross-cultural validation of the TOPS 2S, which yielded promising results. The reliability coefficients of the TOPS 2 improved when negatively worded items were removed during the analysis. The higher correlations between the corresponding practice and competition subscales could possibly indicate that the players were not able to differentiate between practice and competition in relation to mental skills.

The model fit, however, improved when these corresponding subscales were combined. Also, the negatively worded items did not perform as well as in the TOPS 2 data and excluding these from the analysis again improved the model fit. A possible implication of this could be that certain questionnaire constructs and language may not be appropriate in this cross-cultural setting (Fiji), and caution should be exercised when used in these settings. Further research in this area is warranted.

In Part B, the quantitative intervention study was categorised into two sections. Part B1 reported intervention effects on the mental skills use, while Part B2 presented the intervention effects on psychological strengths. Results indicated that the players utilised mental strategies to some degree in practice and in competition. There were intervention effects for goal setting, relaxation, self-talk, and imagery. Evidently, the multicomponent package had given the players opportunity to determine their choice of mental strategies. The intervention also showed significant mediation effects of these strategies' effects on the psychological constructs. Overall, the total effect sizes were not significant, thus signifying weak mediation effects. As recommended by Horn et al. (2011), perhaps the intervention length of around 10 weeks or more for novice participants (such as the case in Fiji) would be more appropriate than a five-week program. Further research is needed for more definitive findings.

In the Part C findings, coaches also made very little reference to the psychological constructs. Nevertheless, coach interview data indicated that the intervention was very well received by both the coaches and the players. The coaches stated that the players' sports performance, as well as school academic performance, improved because of the mental skills training. The coaches equally gained personal benefits from delivering the intervention.

Overall, the three parts to this chapter showed that the participants' limited English knowledge may have hindered some aspects of the intervention process, primarily the responses to questionnaires. However, overall, this chapter showed that multicomponent mental skills training, based on a comprehensive process, can be a versatile model that would bring desired positive results for athletes. Even with many limitations, and under the difficult conditions of conducting the intervention in another country, both the qualitative and quantitative components of the intervention study showed that mental skills were effective strategies not only for sports performance, but for players' well-being as well. The mixed method design had expanded the intervention research, complemented, and strengthened the study's findings.

Chapter 6

General Discussion and Conclusion

The broad aim of this thesis was to examine the effect of a group-based mental skills training intervention program, specifically for football performance. The thesis further explored the sport-specific considerations and issues related to understanding and measurement of the most common mental strategies found in the literature. There were six specific purposes of this thesis. Firstly, the dissertation meta-analytically reviewed and examined the relationships between mental skills training and sports performance. Second, a short version of the widely used Test of Performance Strategies (TOPS 2) questionnaire was developed, followed by a rigorous analysis to validate this instrument. Third, through the intervention study in Fiji, data was collected to investigate cross-cultural support for the TOPS 2 short form (TOPS 2S). Fourth, the primary purpose of this thesis was to investigate the effectiveness of the mental skills training in increasing use of mental strategies, which, in turn, was anticipated to lead to enhanced football performance. Fifth, the current study also investigated effects of the intervention on psychological strengths, self-concept, mental toughness, life effectiveness, and flow. It was anticipated that the intervention would lead to improvement in competitive performances via the use of mental strategies. Finally, I examined the coaches' perspectives on the mental skills training and its effect on the players, as well as on their well-being. This chapter provides discussions on these findings, which are presented under the summary of each chapter.

As for the results chapters, Chapter 3 of this thesis addressed the meta-analytic findings, Chapter 4 presented the details on development and validation of the TOPS 2S, while Chapter 5 presented the intervention results and was composed of 3 parts (Parts A-C). In Chapter 5, Part A investigated the validation of the TOPS 2S in cross-cultural settings. Part B presented the information on the quantitative aspects of the intervention in Fiji that addressed the fourth and fifth specific purposes, the effectiveness of the intervention on use of mental skills and its effect of the psychological strengths. Part C presented the sixth aspect of the specific purposes, which presented the qualitative component of the intervention that examined coaches' perspectives on the effectiveness of the intervention program. Finally, the implications of the findings and directions for future research were also discussed.

Summary of Chapter 3– Effects of Mental Skills Training on Sports Performance: A Meta-analysis

Summary Findings

The meta-analysis presented in this chapter investigated the effects of mental skills training on sports performance. An overall effect size of 0.72, with a 95%, confidence interval of 0.60 -0.85 was obtained for mental skills use and its effects for sports performance. The majority of the variation within this pooled effect size was attributable to differences between studies and, therefore, moderator analysis was conducted to explain the variance. It showed that length of mental practice was a significant factor in determining the effectiveness of the training. The length of mental practice before trials was also examined and the largest effect size was for sessions that were three minutes or less. It was also noted that mental practice of seven to 24 trials obtained the largest effect sizes. Comparatively, mental practice sessions that were outside of these times and trials had moderate to small effect sizes. The duration of the three variants of mental practice, intervention duration, and mental practice session length and number of trials, produced a non-linear pattern of results. Evidently, similar trends were reported by previous meta-analyses (Driskell et al., 1994; Feltz & Landers, 1983) mentioned in this review. Some of the reasons for this non-linear pattern discussed earlier on (quality of instructions and different learning stages of participants) may not seem conclusive. Therefore, further examination is warranted.

Even with the non-linear pattern, it was evident that the mental practice length, whether it was the intervention program length, length of each session, or the number of trials had a positive effect on sports performance. Mental practice that is too short or very long may enhance sport performance, but the desired maximal effect is obtained through a certain amount of mental practice, as discussed previously.

The current meta-analysis also indicated that when compared to other meta-analyses (Driskell et al., 1994; Feltz & Landers, 1983; Hatzigeorgiadis et al., 2011; Kyllo & Landers, 1995), mental skills demonstrated moderate to large effect sizes. However, caution must be exercised when comparing to these meta-analyses since they did not systematically explore the risk of bias, and there would be uncertainty regarding internal validity.

Moreover, even though not significantly different, there were also some interesting findings on mental skills that showed that multicomponent strategies had the highest effect sizes when compared to single mental skill strategies. Studies (Afrouzeh et al., 2015; Coelho et al., 2012) have reported that multicomponent strategies were more effective than use of a single mental skill. Perhaps further study in this domain is warranted for conclusive findings.

General discussion. Intervention studies, based on the five mental strategies; self-talk, relaxation, imagery, goal setting, and multicomponent were combined for the meta-analysis. Combining individual studies in meta-analyses increases the sample size, which in turn increases the power of the meta-analysis (Moore, 2012). Moore (2012) further stated that combining studies increases reliability and precision of the studies. Effect sizes were obtained for studies, and through this process useful information on the strengths and direction of use of mental strategies were determined. Gardner and Moore’s (2006) work was reflected in exploring the effects of the five most common strategies mentioned above. There were some contradictory findings, especially when compared to Gardner and Moore’s (2006) review, which argued that favourable effect sizes on effectiveness of mental skills training were questionable and that the majority of the mental skills studies did not meet the empirically supported intervention.

The current meta-analysis argued that it was necessary to include a wide range of studies to present a comprehensive investigation of the use of mental skills for improving sports performances. The broad inclusion criteria adopted in this meta-analysis allowed room for both the poor and good quality studies. This minimises reviewer bias in selecting studies and gives the reviewers scope to explore more questions than only good studies allow (Abrami et al., 1988). Meta-analysis has mechanisms in place to investigate the consistency of the treatment effect of combining different and conflicting studies (Higgins & Green, 2009), and, therefore, the inclusion criteria were adopted that could capture most intervention studies regardless of methodology. Abrami and colleagues (1988) advised reviewers to consider the varying quality rather than relying exclusively on significance when selecting studies for reviews.

There were two main factors that differed from the previous meta-analysis studies. Firstly, this meta-analysis reported the overall effect size of the combined five mental strategies of self-talk, imagery, relaxation, goal setting, and multicomponent. This is in line with the current trend where many sport psychologists have used either single skill intervention or multicomponent packaged program to help athletes increase their performance, (Cirimele, 2010).

Secondly, this study adopted the broader definition of mental practice, which encompassed visualization as well as other mental strategies of cognitive preparation (Guerra et al., 2018). When conducting this meta-analysis, the first question recommended by Moore (2012) that was addressed was whether the studies included in this research were comparing similar problems. Some may argue that using meta-analysis should compare apples with apples, and that different mental skills address different problems, so combining them may not be measuring the same thing.

However, this researcher's view was that studies based on these five strategies (i.e., self-talk, goal setting, relaxation, imagery, and multicomponent) were captured into the broad definition of mental practice (as discussed previously) that enhanced sports performance. During mental practice athletes practice a specific task by using their intellect, cognitive skills, and imagination (Cirimele, 2010). Sport psychologist incorporates an array of interventions that fall under the umbrella phrase of mental practice. The four dominant mental skills; goal setting, self-talk, relaxation and mental imagery were combined together to obtain the overall pooled treatment effect for the current meta-analysis. The studies reviewed in this meta-analysis incorporated different designs and methodologies with a wide range of variables that differed, such as types of outcome (tasks being measured) and participants with different ages and backgrounds from around the world. Feltz and Landers (1983) outcome variables coding categorisation was adapted to place participants' experience with the task; cognitive, motor and strength.

Some researchers (Gardner & Moore, 2006) argued for the inclusion of studies with the best empirical evidence, while others (Abrami et al., 1988) opted for an intermediate position and urged reviewers to take greater care when detailing reasons for including and excluding individual studies. It is evident from the discussions that an intermediate stand was adopted for inclusion/exclusion of studies for the current meta-analysis.

Summary of Chapter 4– The Test of Performance Strategies (TOPS 2): Development and Validation of the TOPS 2 short form

Chapter 4 presented the critically examined psychometric properties of the Test of Performance Strategies (TOPS 2), an instrument that measures mental skills and strategies used by athletes in competition and during practice. The main aim of this research component was to develop a robust, reliable, and valid short form (TOPS 2S), which was utilised in the follow-up intervention study. The psychometric examination of the TOPS 2 was necessary to ascertain its reliability and validity, as one of the criteria for development of a short form was to start with a strong instrument (Marsh et al., 2010). The development of the TOPS 2 short form adopted a construct validity approach recommended by Marsh and colleagues (2010) and conducted relevant psychometric analyses.

The Present Investigation

The TOPS 2 secondary data obtained from one of the authors of the TOPS 2 (Pat Thomas) was used for the primary analysis. Further analysis was conducted when TOPS (original instrument) data was obtained from Professor Lane through his study (Lane et al., 2004) and merged with TOPS 2 data. The merged data analysis was mainly for comparison and to strengthen the development of the TOPS 2 short form analysis. This was discussed in depth in Chapter 4. Since similar results were obtained for both analyses, only primary results are discussed here.

TOPS factors such as Negative Thinking and Attention Control that are incongruent with the four mental skills (self-talk, goal setting, relaxation and mental imagery) were included in the intervention study. This was to get overall data for the psychometric analysis for TOPS.

Summary Findings

TOPS 2 and TOPS 2S reliability estimates were consistently high for each subscale and showed good reliability across all 17 factors. However, in comparison, the Cronbach's alphas calculated for the TOPS 2S subscales were slightly lower than the corresponding TOPS 2 scales. All reliability coefficients were mostly above 0.70.

The model fit and factor structure. The confirmatory fit indices fell in the traditional criterion advocated by Hu and Bentler (1999). The RMSEA, CFI, and TLI all showed adequate to good fit for the TOPS 2 and TOPS 2S. Both ESEM and CFA showed good model fit. However, ESEM indicated a better model fit with the same data when compared to CFA results.

There was some improvement in the fit indices for the TOPS 2S competition and practice scales in comparison to the long form, thus also signifying the robustness of the TOPS 2S. The sixteen target factor loadings for the short form scales had slightly better factor loadings for both competition and practice subscales when compared to the long form. The MTMM results showed that the validity diagonal values were higher than the values in its column and row in the heterotrait-heteromethod (HTHM) triangles, thus indicating that the TOPS 2S had met the criteria for convergent validity. The MTMM analyses further affirmed the validation of discriminant validity for both the TOPS 2 and TOPS 2S.

General Discussion on Summary Findings. Short form instruments have been around for a long time (Marsh et al., 2010); however, there were critics (Smith et al., 2000) who argued that it was rarely justified and there are unduly optimistic views of the short forms regarding their validity. Marsh and colleagues (2010) proposed strategies for the development and evaluation of the short form with methodological focus on construct validity, and that was employed for the current investigation. The MTMM design (Campbell & Fiske, 1959; Marsh et al., 2010) provided a very strong evaluation for convergent and discriminant validity for the TOPS 2S.

The development of the short form instrument was based on the application of theory and empirically researched strong methodology and followed a clear line of progression advocated by Marsh and colleagues (2010). They recommended a set of four basic guidelines to increase the validity of the development and evaluation of short forms of existing psychological instruments: **(1)** start with a strong instrument. The current literature indicated that the TOPS 2 was a strong instrument; **(2)** the short form must retain the content coverage of all the factors. The MTMM analysis provided a rigorous test for this guideline (Marsh et al., 2010); **(3)** all factors on the short form must be adequately reliable. Alpha values of 0.70 are accepted as good indicators of internal reliability. All the factors except one were above 0.70 for the TOPS 2S. This lone factor reliability coefficient was 0.686 and only marginally below 0.70 and is accepted as adequate reliability due to the lower number of items in the subscales (Tabachnick & Fidell, 2001); and **(4)** short form must retain the factor structure of the original form. This guideline overlaps with the discussion of guideline 2.

A robust, reliable and valid TOPS 2S was developed, which retained the long form structure with all 17 factors to maintain the breadth and depth of each factor. Reducing four-item factors to three items per factor may offer noticeable benefits to the applied researchers in cutting down the administration time.

There were some concerns whether the TOPS is suitable with adolescents (Lane et al., 2004) and in cross-cultural settings (Fernandes & Fernandes, 2015). The consensus was that the TOPS can be used in all settings; however, caution needs to be exercised (Lourido et al., 2018). It was beyond the scope of this study to address the reading comprehension of the TOPS 2 questionnaire. Addressing the reading comprehension in development of the short form could potentially compromise the validity of the questionnaire and therefore it was left intact.

The suitability of the TOPS 2S in cross-cultural settings, such as Fiji, is discussed in the sections below. In summary, the TOPS 2S presents as a psychometrically strong instrument that would be appropriate for a variety of sports research.

Summary of Chapter 5– Development of a Practical Model for Coaches to use Mental Strategies to Enhance Psychological Strengths for Athletes

A mixed method design model was employed for the intervention study. The quantitative Part A investigated the psychometrics of the TOPS 2S instrument used in this intervention. Both Part B1 and B2 were quantitative methods. Part B1 investigated the intervention effects on mental skills. Part B2 investigated the psychometrics and intervention effect on psychological strengths of mental toughness, self-concept, flow, and life effectiveness. Part C employed a qualitative approach and examined the coaches' perceptions on the effects of mental skills training on use of mental skills, psychological strengths, and the football performance.

Study 3 Part A: Psychometrics of TOPS 2S with Fiji Data.

The TOPS 2S developed and presented in Chapter 4 was utilised for this study. Part A of this chapter examined the psychometric properties of the TOPS 2S and validated the instrument in a cross-cultural setting from the data collected during the intervention research in Fiji. The TOPS 2 long form showed good, strong psychometric properties when used with countries with English as a first language. However, when the translated version of the TOPS 2 was implemented in a cross-cultural setting, such as with Brazilian (Fernandes & Fernandes, 2015) and Greek (Katsikas et al., 2011) speaking populations, it did not show good model fit.

However, Lourido and colleagues (2018) showed that the competition scales of the translated TOPS 2 in Spanish settings indicated acceptable model fit. It is important to note that translated versions of both the original and the refined Test of Performance Questionnaires (TOPS and TOPS2) did not show strong psychometric properties prevalent in their original forms (fit indices of the translated versions were presented in Chapter 4). It is possible that the TOPS constructs could be complex for people from differing cultural backgrounds.

Summary findings and discussion. Moderate reliability estimates above 0.60 were obtained across the TOPS 2S factors except for attentional control and negative thinking, which were very low. It was also felt that the participants may have been confused with the negatively worded items, as there seemed to be incorrect responses to these measuring items. Hence, the reverse coded, negatively worded items underwent additional scrutiny in the follow up analyses in Chapter 5, Part A. Also, elevated correlations (>0.80) were obtained, which possibly indicated that the participants were not able to differentiate between the corresponding practice and competition scales. It was deemed, from the Fijian participants, through responses to the questionnaires that they were not able to grasp the negatively worded items, and that they were not able to differentiate clearly between the parallel worded items in practice and competition subscales.

The model fit for the Fiji data did not meet the good model fit cut-off criteria advocated by Hu and Bentler (1999). However, when negatively worded items (removed) and parallel worded items were accounted for, the fit indices significantly improved. It was apparent from the responses to the items that the questionnaire language and concepts would have been difficult for Fijian participants to comprehend. Hence, analyses of the TOPS 2S in this cross-cultural setting with Fijian adolescents may not indicate an accurate result of the cross-validation.

Moreover, the findings here were like previous research (Donti & Katsikas, 2014; Lourido et al., 2018) on TOPS 2 psychometrics in cross-cultural settings. Katsikas and colleagues (2011) also reported that their weak factor loadings from the Greek translated version of the TOPS competition subscale suggested that participants may not have been able to comprehend the exact meaning of the items. They also reported that with under-15 years old participants, their instrument did not demonstrate adequate psychometrics. Apparently, similar findings of the TOPS full model were reported by Lane and colleagues (2004), where they stated that the language and abstract terms in the instrument were not suitable for adolescents of English-speaking participants, let alone the youths from the diverse cultural settings. Lane and colleagues had called for further examination and possible modification of the language to suit the adolescents.

However, overall the consensus is, as per Lourido and colleagues' (2018) recommendation that although TOPS psychometrics were not very strong, it would be an appropriate tool to use to examine mental skills use in cross-cultural settings, and the results should be interpreted with caution. The probable lack of good grasp of the English language and the abstract concepts should be taken into consideration when using such instruments in cross-cultural settings.

In comparison to these translated versions, the TOPS 2S was in the English language and, therefore, discussions on ethnic groups and cultural differences cannot be overly compared to or generalised by the findings from the Fijian setting. Future research could take note of the language component of the questionnaires when administering them, especially for adolescents with English as a second language. Perhaps more time should be permitted for the participants to complete the questionnaires, with full explanation given on each item so that they have a better understanding of the concepts being measured. Also, for the robustness and generalisability of instruments, such as the TOPS 2S, its applicability and validity in other settings should be authenticated (Morin & Maïano, 2011), including English-speaking populations.

Study 3 Part B: The Intervention-A Quantitative Component

Effects of a five-week mental skills training intervention were investigated in Fijian schools. The school coaches were trained to deliver intervention programs to their football players. A random assignment, wait-list control design was used for this intervention. The purpose of this study was to examine the effects of mental skills training on: **(1)** psychological strengths (mental toughness, self-concept, life effectiveness, and flow); and **(2)** use of self-talk, goal setting, relaxation, and imagery. It was anticipated that mental skills training would increase use of mental skills, which would then increase the improvements in mental toughness, self-concept, life effectiveness, and flow.

Summary findings. Since the practice and competition scales were both highly correlated, the corresponding TOPS 2S scales were combined for the analysis. Negatively worded items were also removed from the intervention analysis, as it was deemed that the Fijian participants were not able to comprehend these items. Also, there were a large number of missing data and, therefore, two SEM models were employed to obtain the best possible results.

To reduce the administration time of the battery of instruments, selected factors and corresponding items were used from the MTI, EASDQ and LEQ-H. The flow instrument, the FSS, had one item per factor, so it was kept intact. The analysis showed good reliability for all psychological constructs, and the overall fit indices also indicated good support for the model. Both the SEM models also displayed good factor loadings.

Intervention effects on mental skills. The two analytic models used showed interaction effects of mental skills training on players, goal setting, attention control, self-talk, and relaxation. This was well-aligned with the current meta-analysis (Chapter 3) findings that showed moderate to high effect sizes for these strategies. Evidently, the meta-analysis also showed nonsignificant differences between these mental skills. The intervention findings differ slightly when compared to the current meta-analysis. There was a marginal intervention effect on imagery and significant effects on goal setting, relaxation, and self-talk for both models in the intervention study.

Some possible reasons in the intervention study for the players' choice of mental skills could be that they were more comfortable to use some skills over others, or the coaches had put more emphasis on the skills that the players had used most. The short duration of the intervention also may not have given players ample time to learn all skills well and, therefore, they were not able to apply all the skills equally well. Similar to learning new physical, tactical, or technical techniques, it takes some time to practice mental skills and put them into effect (Garvin, 2014) for performance gains.

Overall, the results indicated that a structured mental skills training had a positive association with the use of mental strategies; hence, the participants' application of mental strategies increased. Hatzigeorgiadis and colleagues (2011) in his meta-analysis reported that interventions including mental skills training were more effective than those that did not have any mental skill. Findings here are consistent with the general view that mental skills training increases knowledge and use of these skills (Beyer, 2016; Garvin, 2014). It would be beneficial for the players, as well as the teams, if they were able to maintain the motivation and commitment to continue practicing mental strategies for the duration of the competitive season and beyond. This intervention did not have the scope for such a longitudinal study to investigate the retention of the mental skills.

Intervention effects on psychological strength constructs. The psychometrics of the psychological strengths constructs were conducted first, and showed excellent fit and were deemed appropriate for a culturally diverse population such as Fiji. Further analysis was also conducted to examine the mediating effects of the mental skills use on the psychological constructs. There were interesting findings on the mediating effect of the mental skills on self-concept, mental toughness, and life effectiveness. All four mental strategies use (i.e., goal setting, self-talk, relaxation, and imagery) produced positive mediating effects on self-concept. Use of goal setting and relaxation also showed positive mediating effects on life effectiveness and mental toughness. The direct effect was also largely not significant for all constructs, except for two mental toughness factors. There was no total intervention effect on psychological strengths outcomes except for one component of flow. This possibly indicated that the effect of the intervention on these outcomes was weak.

The intervention effect on the psychological strengths could be weak due to the relatively short duration of the intervention. Short-term positive effects on mental skills might be expected to mediate longer-term effects on other outcomes, but we were not able to test this with a follow-up. Nevertheless, there was some evidence that intervention effects were mediated by mental skills. The mediation effect was weak and warrants further attention.

The short duration of the intervention would have provided few opportunities for the coaches to deliver the intervention program. Consequently, there would have been very little opportunity for the players to use these strategies to have a visible effect on their psychological gains. Perhaps more time for the intervention was necessary to get the psychological strengths benefits of the program. The workshop model first required the trainers/coaches to learn the skills, and only then they would be able to effectively deliver the knowledge and the skills gained to their players. Transferring the learned skills to the players requires a longer timeframe than allocated to the current intervention.

Overall, it could be argued that multicomponent strategies gave participants an opportunity to be selective in the choice of strategies they wanted to use, as compared to a single mental skill program that would not give them that choice. Furthermore, five weeks may not be enough to administer a train the trainer model intervention, let alone a direct intervention to the participants, and to measure the full benefits of a mental skills training program. Hence, a firm conclusion on the effectiveness of mental skills training on the psychological constructs as mediator variables could not be made from this intervention study.

It is possible that different results would have been obtained if the intervention was conducted with professional or elite football players. At a professional level or elite level, there are greater financial gains from the sport. It would be more likely that professional and elite athletes would dedicate more time and effort on mental skills training when knowing that it could enhance their competitive performances, and there would be more personal gains.

Study 3 Part C: The Intervention- Coaches' Perception of the Effectiveness of Mental Skills Training Program-the Qualitative Component.

This component of the research explored the views of the football coaches on the use and effectiveness of mental strategies on football performance. All the coaches were school teachers and in charge of their school football teams. Eleven coaches from 15 schools volunteered to be interviewed for this project. This group of coaches did not have much exposure to sports psychology or use of mental skills training. However, there was no intention to underestimate prior knowledge of the psychological skills that the coaches may have acquired. Many teachers taking a coaching role for their school teams would be well versed with some form of mental preparation as a result of their experiences and education (Freitas, 2012) and, therefore, it would be easier for them to learn and execute the mental skills training program. Once introduced to the mental skills training and its potential benefits, coaches would be able to further educate themselves and explore these concepts via videos and articles and through many other means, including the internet. The qualitative component of the intervention reflected the coaches' perceptions and opinions of the effectiveness of the mental skills training program they had learned and delivered to their football players.

Summary findings. The interview feedback from the coaches indicated that the coaches were able to successfully administer the program to their respective football teams. They reported that the program was beneficial for both the coaches as well as the players. The coaches embraced the program enthusiastically and stated that players' and football team performance improved as a consequence of the intervention, and they were able to achieve better results than anticipated. They also reported numerous benefits besides the football performance for both coaches and players, including in the school learning environment.

Coaches applied principles of mental strategies within their work practices to gain personal benefits, such as being able to improve their own coaching performance, regulate their emotions well, and improve their teaching practices. The coaches believed that the players were able to transfer these skills into their school work and, as a result, their academic performance improved significantly. Certainly, in school coaches' view, this mental skills training program added value to students' education and well-being. Students' psychosocial well-being is also of paramount importance, and school environment can contribute to their healthy development (Hobby, 2014). In light of these findings regarding the extent to which the coaches found the mental skills training program contributed to student development, it should be viewed favourably and embraced by the schools and also other stakeholders responsible for student/player wellbeing.

Some noticeable aspects of the program were that the coaches and players largely did not distinguish use of mental strategies between competition and practice phases. However, the coaches reported that players used the mental strategies more frequently due to the intervention process. A more definitive positive effect of mental skills training could have been obtained through a player focus group discussion. The focus group discussion is a qualitative approach through which in-depth information could be obtained to get a better understanding of the intervention effects (Nyumba et al., 2018). However, it was not in the scope of this study to conduct interviews through player-focused discussion groups. Future research could explore this concept.

When questioned on psychological strengths, coaches were not able to aptly identify these except life effectiveness benefits (in relation to life skills benefits outside of football performance) from the use of mental strategies. Coaches in this study seemed to have recognised the significance of mental skills in enhancing their well-being, and, therefore, encouraged their players to apply these skills in classroom settings for academic gains. As in Gould and colleagues' (2007) study, coaches here were able to identify what they did in building life skills, such as emotion regulation and enhancing academic work, in their players. A well planned interview script could have elicited better responses from the coaches.

Many coaches reported that mental skills concepts were new to them and they needed further training and resources to upskill themselves. Similar findings were apparently found in Freitas' (2013) study where coaches reported feeling unprepared to conduct mental skills training programs. Perhaps more time to assimilate these strategies into their training program could lead to a stronger effect on the intervention and also give coaches good practice and consolidate their learning. This lack of knowledge seems to be one of the major limiting factors that add to coaches' inability to administer such programs. Freitas (2012) encouraged collaboration between coaches and sports psychologists in overcoming these obstacles.

Psychological programs such as mental skills training should be introduced at all levels of coach education. However, a limiting factor would be lack of qualified personnel to deliver such programs, especially for underdeveloped countries such as Fiji. Also, the financial burden on the football organisation (and schools, in the case of Fiji) becomes an important factor in hiring sports psychologists to conduct such educational mental skills training programs. Austin (2013) suggested varying price options with time commitments as a solution to accessing sports psychology consultants' services.

Train the trainer model. Another contributing factor to a successful implementation of the mental skills training program, was the approach of intervention delivery. The train the trainer program was potentially a valuable tool, and it maximised the benefits of mental strategies. The current program promoted the experiential learning approach to gaining valuable skills, in which coaches then were to be able to impart to the players. Even with the time constraints and partial benefits, as evidenced by the mediation effects of the intervention, it seemed that the coach education and training model adopted was an economical and viable model that could encourage coaches to embrace the mental skills training. Coaches at schools found many benefits of this train the trainer model. It allowed them control of the team and to deliver the programs at their convenience. In Fiji, apparently this was the first time such a psychologically based program was learned and delivered to the football players by coaches or teachers. During this intervention, coaches were aware of the content of the mental skills training program and were in control of the whole delivery process. Unlike when the program is delivered by sports psychologists, the coaches are generally not aware of the full content of the program content, and they also may not have full control of the delivery process.

Beyer (2016) found that coaches had greater influence than the sports psychologist in delivering and implementing the mental skills program. Coaches would have to adhere to strict schedules if it was delivered by sports psychologists and, also due to the intervention methodological constraints, not be able to have an influence in the delivery of the program. The autonomy created through the train the trainer model enabled coaches to select appropriate times for the delivery, and at multiple times at their own convenience. Coaches would have greater access to the players and there would be more opportunities for them to integrate quality mental skills training into their football training programs and also encourage players to frequently use these skills. Also, since coaches would have greater knowledge of the tactical and technical nuances of the game they would be in a better position to relate the mental skills training specifically to the training demands and generate maximum benefit of the program for the team and the athletes.

Having learned the mechanisms of the mental skills training and its delivery process through the train the trainer workshop, coaches would be able to retain the skills for a long period of time (Scherzer, 2004), and would be in a position to deliver these strategies whenever needed.

Therapeutic nature of multicomponent skills. The researcher did not envisage the compelling evidence from the coaches on the well-being gains from the intervention. The mental strategies employed in this intervention had additional benefits besides improving players' competitive performance. The multicomponent package of goal setting, self-talk, relaxation, and imagery seems to encompass therapeutic characteristics of cognitive behaviour therapy that have shown to be effective in cognitively restructuring the thoughts that helps to rationalise and plan to execute desired actions for an event (e.g., for sports, academic, or arts performance).

Researchers have reported the psychological principles of these mental strategies. Some examples are listed here. Dugdale and Eklund (2002) reported that cue words (self-talk) appropriate to the activity supressed unwanted and negative thoughts. Besides skill and strategy learning, other outcomes of imagery are modifying cognitions and regulating arousal and competitive anxiety (Gould et al., 2014). A goal setting study by Devonport and colleagues (2013) found that goal setting was associated with managing stressors and player well-being. Foster's (2017) study results aligned with the current findings, and he reported that psychological skills made significantly moderate contributions to sports, as well as to global well-being. He stated that setting goals builds up psychological well-being, as it develops traits associated with positive affect and helps individuals possess a sense of purpose. Foster (2017) further stated that relaxation was a very strong predictor of well-being and that it buffers negative psychological effects from competitive performance. The therapeutic nature of mental skills is evident from those findings listed above, and this seems to have a mediating role and contribute to players' competitive sports performance. The current study did not have the scope to examine this.

Conclusion

The qualitative component of the present study signifies that coaches can be trained to deliver effective successful mental skills training to improve not only athletic performance, but also psychological well-being. The train the trainer model has shown to be an economically sound model for that purpose. Having learned the skills themselves, coaches were able to aptly deliver these skills to their players. Moreover, they were able to apply these skills themselves to gain personal and professional benefits.

Not all sports require the same mental strategies. Some mental strategies exert different influences for successful outcomes across different sports. It may be necessary for researchers to examine psychological preparation of athletes and coaches not only in general, but also for sport-specific purposes (Freitas, 2012). This thesis intervention acknowledged that mental strategies introduced to coaches and players needed to be sport specific. The technical and tactical training with physical aspects of football requires mental skills consultants to have a sound knowledge of the game to be able to make more successful contributions to psychological preparation to the players. The present study had discussed a number of significant issues that could enhance psychological preparation of coaches and players for better competitive performance.

Limitation of the Research Study and its Implications

It is very important to identify limitations associated with research studies and interpret the findings accordingly to determine future directions in the field of study. Due consideration should be given to the methodological limitations of the design (Amirault, 2000). The results chapters in this thesis discussed the specific limitations within each study.

The purpose of this section was to review some specific limitations from each, chapter as well as give a general view on its implications.

Meta-analysis. To the researcher's knowledge, there was no other meta-analysis that reported effect size of a multicomponent mental skills strategy. Also, the meta-analyses studies on mental practice (Driskell et al., 1994; Feltz & Landers, 1983) cited widely in this thesis were old, and adopted the traditional view that defined mental practice as visualisation. They excluded any other form of mental preparation, whereas this thesis took a broader view of mental practice that utilised one or more mental skills in mental preparation procedure. The two points raised above could be considered a limitation, as accurate comparisons could not be made to prior meta-analyses. Hence, the moderator results comparison made to Driskell and colleagues' (1994) and Feltz and Landers' (1983) meta-analyses should apply caution since their studies, even though they closely resembled the current results, may have only partially measured the same things. Furthermore, it was deemed that multicomponent strategies would take longer to implement, as there were more than one mental skills employed in this strategy. Thus, the mental practice length associated with this strategy needs to be accounted for when interpreting the results.

A risk of bias using the Cochrane Risk of Bias tool indicated that no studies included in the meta-analysis were identified as low risk of bias. Hence, this limitation must also be taken into consideration when interpreting the meta-analysis results. Furthermore, this meta-analysis did not consider unpublished results and could be deemed to have a selection bias. Feltz and Landers (1983) stated that possible reasons for unpublished results could be that they were weak or nonsignificant. They stated that such selection bias in a meta-analysis may not be representative of typical mental practice effects.

Another limitation to the current meta-analysis was that some of the effect sizes obtained was based on a small number of studies. Hatzigeorgiadis and colleagues (2011) stated that caution is needed when interpreting such effect sizes, as small samples could produce larger effect sizes. The selection of only English languge studies for the meta-nlysis could also create a potential bias (Noetel et al., 2017). Language bias is introduced when reseachers exclusively select particular language-based studies and reject potentially quality results from locally-based studies if they are in different languages (Egger, Dikersin, & Smith, 2001; Moore, 2012). Hatzigeorgiadis and colleagues (2011) recommended that restriction of selection to a particular language should be acknowledged.

TOPS 2S. The measures of mental skills training using the TOPS 2S and subsequent analyses gave explicit clarity on the reliability and validity of the instrument. However, the TOPS 2 long form did not show good model fit in cross-cultural settings, and researchers (Donti and Katsikas, 2014; Lourido et al., 2018) recommended caution when using the instrument in those settings. Similar findings were obtained in the Fiji cross-cultural setting for the TOPS 2S. This limitation could lead to lack of generalizability of the short form across wider populations. Lack of comprehension to the complex and abstract concepts prevalent in the TOPS and TOPS 2S seemed to be a limiting factor here.

Lane and colleagues (2004) questioned the inappropriateness of the TOPS language, especially when administering to adolescents. Morin and Maiano (2011) further added that it would be harder for adolescents to distinguish abstract formulations as depicted in the TOPS 2 since adolescents have limited cognitive ability. These comments were not addressed when the original TOPS was refined to the TOPS 2. Consequently, the short form, TOPS 2S, could not modify the items, as it needed to maintain the content breadth and depth, as well as the factor structure of the TOPS 2. Hence, accordingly, the language of the TOPS 2S remained unchanged. Future research could address this problem and perhaps modify the language so that the TOPS 2 and TOPS 2S are adaptable to all younger age groups, as well as in cross-cultural settings.

Intervention study. This research was conducted from the beginning to mid-school term and there were many logistical limitations, such as the readiness of the school team, coaches giving priority to academic schedules rather than the mental skills intervention, and the reluctance of the school management to allocate good quality time for the study. Future research should look at the timing of the intervention to get maximum support from the school hierarchy, coaches, and the players.

Data collection. The pre-test responses from the participants seemed very high. This has been discussed previously. It was most probable that the participants made erroneous responses due to difficulty understanding the English language. It could also be the players desire to please the researcher or the coaches. From the researchers' understanding of the Fijian setting such deferential responding is consistent with the Fiji culture. Player and coach education on the questionnaire items could have alleviated this problem. However, this was not possible for the current intervention since very little time was allocated for the data collection. There were limitations in the research design that did not allow for detection of the causes of the high scoring. It was generally left to the researchers' intuition or presumptions to explain such results.

Data collection in most schools was rushed to some degree due to the academic loads pressured onto the schools by the Fijian Ministry of Education. Schools were allowed very little time, as they were instructed to keep learning disruptions to minimum. Weingarten and colleagues (2018) found that lack of support in schools was a common problem, as schools were more focused on subjects such as maths and science, with federal grants tied to academic performances. More time allocated for the intervention effect and collection of further waves of data would have provided a stronger result.

Lack of support from other teachers within the schools was also an obstacle encountered during this intervention. Some coaches reported that teachers in a few schools were reluctant to allow students time off during class time to fill in questionnaires. In these schools, questionnaire administration time was allocated after school hours. The problem with this was that many students needed to catch buses home and were either not available to complete the questionnaires, or rushed through them to catch the buses home on time. This could have compromised the accuracy of the students' responses to the questionnaires.

Another limiting factor was that, at the time of the experimental group workshop to train the coaches, some schools did not have their football teams ready. As a result, as coaches started building their football teams, many students who completed first wave of data were replaced by other students. This resulted in a large amount of missing data. The first wave of data collection would have been delayed until the full selection of team was in place if this was brought to the researchers' attention. However, statistical analysis design was modified to manage the missing data.

***Fidelity check*.** Even though all coaches delivered the intervention, coach readiness to deliver the intervention, after the workshop, should have been formally verified. This would have given more credence to the delivery of intervention. Generally, it is assumed that after the training programs all attendees would be suitable for intervention delivery. Future studies should examine the trainer's preparedness to deliver the intervention as a quality assurance check. Furthermore, coaches could have filled in check sheets weekly to indicate their delivery of each mental skill. This would have provided some quality assurance to the intervention and perhaps compelled all coaches to deliver the full program. Future research should incorporate such quality assurance to give more credibility to the intervention program.

A qualitative approach was utilised to investigate only coaches' perceptions of the effectiveness of the intervention. To supplement the coaches' perceptions, players' perception of the effectiveness of the intervention could have been examined. This would have been achieved through players' discussion focus groups. Future research could address this issue and collect data from both the coaches and athletes to get a more definitive effect on the intervention.

Conducting this intervention in another country had many challenges, such as researchers not being readily available for the coaches, and these were probably the major limiting factor. Whenever in Fiji, the researcher, however, committed to visiting the schools, meeting the school hierarchy, and the coaches to maximise the schools' input into the intervention.

Future Directions

Mental practice length. This thesis, through the three studies, laid out a firm foundation for the coaches and stakeholders to get a better understanding of the mental skills factors contributing to optimal competitive sports performance. Even with many limitations and shortcomings of this study, it was evident that length of mental practice could be the determining factor in optimising performance. This valuable information could help coaches and athletes to tailor their training program to get the maximum benefits. The non-linear effect size of mental practice is not conclusive; hence, future intervention studies could further explore this.

Intervention length. Longitudinal studies need to allow for more time between baseline and post intervention for the effects to be determined. A multiple timeline, more than two, may be necessary to obtain a better relationship between the intervention, the mental skills use, the psychological constructs, and the sports performance. This would give the participants a better understanding of the implications of the mental skills training in enhancing psychological constructs that could help enhance competitive sports performance.

Training behaviours as mediators for sports performance. Mental skills training encourages self-monitoring, since it requires athletes to become aware of their feelings, thoughts, and behaviours (Amirault, 2000); as such, one would assume that the training behaviours would improve with the implementation of mental skills training program (Alqallaf, 2016). The current intervention coach interviews showed that coaches were able to better manage their players, and they also reported that players' behaviours had improved as a result of the mental skills training. A flow-on effect of this would be that the quality of the training sessions would improve. There is potential for future research to also examine the role of mental skills training on mediating factors, such as self-monitoring, training behaviours of athletes, and quality of training in optimising competitive sports performance. It would be more beneficial for the athletes if researchers could discuss such self-monitoring strategies prior to them being implemented (Alqallaf, 2016).

Fidelity check. Quality of the training session could enhance the overall competitive performance of athletes and, therefore, a conclusive quality check was needed. Future research could adopt the key characteristics of the Consolidated Framework for Advancing Implementation Research (Damschroder et al., 2009; Lau et al., 2016) to determine the effective implementation of the interventions.

The TOPS 2S validation analysis showed that the English language may have been a barrier in collecting good analytical data and, therefore, future research could address participants' comprehension of the instrument language and concepts before administering instruments. Quality checks should also be put into place to assess this aspect of the investigation. Future research could conduct the validation of the TOPS 2S with different age groups (adolescents to adults) with diverse cultural groups, including countries with English as the first language and non-English speaking background.

Coach and player benefits. Positive youth development outcomes are fostered through sports participation (Gould & Carson, 2008; Gould et al., 2007). This thesis has provided a solid foundation for future studies to build on the current findings that the effects of mental skills training programs not only enhance athletic performance, but also athletes' life skills and well-being. Coaches also found personal benefits from this intervention. Future studies could explore a structured mastery and caring climate and further enhance athletes' personal development (Gould et al., 2012). Interview questions were not designed to specifically elicit the responses on player well-being and players' academic prowess. However, besides competitive benefits, the general well-being benefits seemed to be considerable for the players and coaches. Coaches and players should give due attention to these additional benefits and collaborate with experts in the field of mental skills training, such as sports psychologists, and develop a systemic way to integrate such a program into their training.

Ideally, sports psychologist should be well versed in the complexities and nuances of football. Having tactical, technical, and physical aspects of football would help sports psychologists respond to the demands of the game. Sports psychologists who are able to present themselves as knowledgeable in many aspects of the game would be able to overcome the negative stigma that is sometimes attached to the involvement of psychologists. Freitas (2012) stated that it is imperative that sports psychologists meet the expectations of the coaches, players, and the organisation hierarchy, such as the club directors, for effective delivery of the mental skills program.

Conclusion

In summary, this thesis presented three studies that examined the effectiveness of mental strategies in sports performance. Firstly, the meta-analysis showed that only a certain length of mental practice produced optimal performance, and that with less or extended practice of mental strategies effect sizes declined. Also, currently, there seemed to be two schools of thought in defining mental practice. It is important to get a consensus on the uniform definition of mental practice.

Secondly, the development of the TOPS 2S in the second study seemed to hold its validity. However, as presented in the third study (Chapter 3, Part A), in the cross-cultural setting, the TOPS 2S showed only some indication on its validity (i.e., corresponding factors of competition and practice were combined and negatively worded items removed for stronger results). Clearly, for cross-cultural settings, when administering questionnaires there is a need to consider appropriate language and its suitability for the population.

The second part of the third study (Chapter 5, Part B) showed that the multicomponent strategy helped players improve use of mental skills training. Questions remain as to whether the players preferred to use some of the skills over the others, or if the coaches were not able to effectively teach these skills to the players in a short period of time. Player-focused group discussions or specific questions relating to this could shed some light on this uncertainty.

The stakeholders, such as schools and football organisations, could hire consultants to train the teachers/coaches at all levels to integrate such programs into their normal training programs. This is not only applicable to football, but all sports. Overall, coaches gave strong indication of embracing mental skills training within their schools. The third part of Study 3 (Part C) presented information where coaches reported that the mental strategies used were effective in enhancing players’ football performance, as well as academic performance. The coaches also found personal benefits of the program where they were able to use these strategies for their personal gain.

The school coaches seemed contented with the intervention program and acknowledged the usefulness of the mental skills program. They seemed eager to gain further knowledge in this field. This interest in the coaches should be developed further through quality educational mental skills training programs. Schools and the football organisations should pursue this further and provide coaches at schools or clubs access to such training programs that would not only benefit the players in sports performance, but enhance players' academic and social aspects of life. The train the trainer model is an economical and effective method of reaching vast numbers of players both at school and club levels. The intervention study has laid a good foundation of implementing this training model for program delivery within the training environment.

A recommendation for coach educators would be to include a sport psychology component, more specifically a mental skills training program, in all coach education programs. The secondary gains from the mental skills training, such as the well-being of both players and coaches, should be recognised and made aware to the stakeholders. Having coaches deliver such programs would reduce the stigma that is generally associated with psychologists running such programs (Freitas, 2012). This would perhaps encourage the coaches and the stakeholders to embrace the mental skills training program. A promising step forward would be for schools to incorporate generic (not specific to any area of focus) mental skills training programs into their school curriculum. More teachers/coaches would also reap the benefits of the program if incorporated into the whole school.

Mental skills training would complete the full dynamic of athletic training requirements for consistent optimal performance, namely, physical, technical, tactical, and mental aspects of the game. It is the view of the researcher that mental skills training should be an integral part of school, and not only football, but every sports organisation.

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Appendices

Appendix A: Effect size calculation formulas

Cohen's d from means	$$Cohen's\ d_{biased} = \frac{(Mtrt_{post} - Mtrt_{pre}) - (Mcon_{post} - Mcon_{pre})}{Pooled\ SDprepost}$$ $$Pooled\ SDprepost = \sqrt{\frac{\left((n_{trt}-1) * SDtrt_{pre}{}^2\right) + \left((n_{con}-1) * SDcon_{pre}{}^2\right) + \left((n_{trt}-1) * SDtrt_{post}{}^2\right) + \left((n_{con}-1) * SDcon_{pre}{}^2\right)}{2 * (n_{trt} + n_{con} - 2)}}$$ (Borenstein 2009)
Cohen's d from t - test	$d = \frac{2t}{\sqrt{df}}$. (Rosenthal, 1994)
Cohen's d from F-test	Replace t by $\sqrt{F}$ so long as the F is based on only a single df in the numerator (Rosenthal, 1994)
Variance of mean difference	Formula 2. Variance of standardized mean difference $$Variance_{biased} = (\frac{1}{n_{trt}} + \frac{d_{biased}{}^2}{2 * n_{trt}})$$ (Borenstein 2009)
Variance of mean difference	Formula 2b. Variance of standardized mean difference for dependent groups (single groups or matched pairs) $$Variance_{biased} = (\frac{1}{n_{trt}} + \frac{d_{biased}{}^2}{2 * n_{trt}})$$ (Borenstein 2009)
Bias Correction Factor	$$= 1 - \frac{3}{4 * (n_{trt} + n_{con} - 1)}$$ (Borenstein 2009)
d_unbiased	$$d_{unbiased} = d_{biased} * Bias\ Correction\ Factor$$ (Borenstein 2009)
V_unbiased	$$Variance_{unbiased} = Variance_{biased} * Bias\ Correction\ Factor^2$$ (Borenstein 2009)

Appendix B: Risk of bias for all studies

Citation	Sequence Generartion	Allocation Concealment	Blinding	Incomplete Data	Selective Reporting	Other Bias	Overall Risk of Bias
Afrouzeh et al., 2015	?	?	?	+	?	+	?
Amal & Nagla, 2011	?	?	-	+	?	+	-
Anderson et al.,1988	-	-	-	?	?	-	-
Annesi 1997	-	-	-	+	?	-	-
Bar-Eli & Blumenstein, 2004	-	-	+	+	+	+	+
Bar-Eli et al.,2002	-	-	?	+	+	+	-
Barwood et al., 2015	-	-	?	+	+	+	-
Barwood et al., 2008	?	?	?	+	+	+	-
Battagilia et al., 2014	+	?	?	+	+	+	-
Bell et al., 2013	-	-	-	+	+	-	-
Blair at al., 1993	?	?	-	+	+	-	-
Blakeslee & Goff, 2007	?	+	-	+	+	-	-
Boyce et al., 2001	+	?	?	+	+	+	+
Brewer & Shillinglaw, 1992	-	-	?	+	+	-	-
Burhans et al., 1988	?	+	-	+	+	-	-
Burton, D. 1989	-	+	?	-	+	-	-
Carter & Kelly, 1997	-	-	-	+	+	+	-
Chang et al., 2014	-	-	-	+	+	+	-
Coelho, et al., 2007	-	-	-	-	+	-	-
Coelho et al., 2012	-	-	-	-	+	-	-
Coker, et al., 2015	?	?	?	+	+	+	-
DeRenne & Morgan, 2013	?	?	-	+	+	+	-
Edwards, et al., 2008	-	-	-	+	+	+	-
Filby et al., 1999	-	?	-	+	+	+	-
Flegal & Anderson, 2008	?	+	-	+	+	-	-
Gapin & Herzog, 2014	?	-	-	?	?	+	-
Getz & Rainy, 2001	-	-	-	+	+	-	-
Giannini, et al., 1988	-	-	-	+	+	-	-

Glynn et al., 2013	-	-	-	-	?	-	-
Gordon et al., 1994	-	+	?	?	-	-	-
Goudas et al., 2006	-	-	-	+	+	-	-
Gray, 1990	?	?	-	+	+	-	-
Greer & Engs, 1986	-	-	-	+	?	+	-
Grouios, 1992	?	+	?	+	+	+	+
Giucciardi et al., 2009	?	?	?	+	+	+	-
Guillot, et al., 2013	-	-	+	+	+	+	+
Guillot, et al., 2010	-	-	?	+	+	-	-
Hall et al., 1983	?	?	?	+	+	-	-
Hall & Hardy, 1991	?	?	?	+	+	+	-
Hall & Byrne, 1988	?	?	?	+	+	-	-
Hammond et al., 2012	-	-	?	+	+	+	-
Hardy & Callow, 1999	+	+	-	+	+	+	+
Hashim et al., 2011	?	?	?	+	+	-	-
Hatzigeorgiadis, et al., 2004	?	?	-	+	+	+	-
Hatzigeorgiadis, et al., 2007	-	-	-	+	+	+	-
Hecker & Kaczor, 1988	-	-	-	+	+	-	-
Heiland & Rovetti, 2013	-	-	?	+	+	-	-
Heiland et al., 2012	-	-	-	+	+	-	-
Holm, et al., 1996	?	+	?	+	+	-	-
Horn et al., 2011	-	-	-	+	+	+	-
Hughes, 1990	-	-	?	+	?	-	-
Jeon et al., 2014	?	?	-	+	+	-	-
Johnson, et al., 1997	?	+	-	+	+	+	+
Kim & Tennant, 1993	?	?	-	+	+	+	-
Kingsley et al., 2013	?	?	-	+	+	+	+
Lamirand & Rainey, 1994	-	-	-	+	?	-	-
Landin & Hebert, 1999	-	-	-	+	+	-	-
Lane & Streeter, 2003	?	?	-	+	+	-	-
Lanning & Hisanga 1983	?	?	+	+	?	+	?
Lerner & Locke, 1995	-	-	-	+	?	+	-

Lerner et al., 1996	?	?	-	+	?	-	-
Lohr & Scogin, 1998	-	-	-	+	?	+	-
Louis, et al., 2012	-	-	-	+	?	-	-
Lutz,2001	?	?	-	+	?	+	-
Masciana, et al. 2001	+	?	-	+	?	+	-
Mashayekh, et al., 2014	-	-	?	+	?	?	-
Maynard & Cotton, 1993	-	-	-	+	?	-	-
Maynard et al., 1998	-	-	-	+	?	-	-
McCarthy et al., 2010	-	-	-	+	?	-	-
Meacci & Pastore, 1995	-	-	?	+	?	-	-
Meacci & Price, 1985	?	?	?	+	?	-	-
Mellalieu et al., 2009	-	-	-	+	?	-	-
Miller & McAuley, 1987	?	?	?	+	?	+	?
Mooney & Mutrie, 2000	-	-	?	+	?	+	-
Mousa et al., 2013	?	?	-	+	?	+	-
Mullen et al., 2015	?	?	?	+	?	+	?
Munroe-Chandler et al., 2012	-	-	-	+	?	-	-
Munroe-Chandler et al., 2005	?	?	-	?	?	-	-
Murphy & Woolfolk, 1987	?	?	?	+	?	+	?
Nelson, et al., 2008	?	?	?	+	?	+	?
Olsson, et al., 2008	?	?	-	?	?	+	-
Onestak, 1997	?	?	?	+	?	+	?
Ortega et al., 2013	-	-	-	-	?	-	-
Page et al., 1999	-	-	-	+	?	-	-
Papaioannou et al., 2004	-	-	?	+	?	-	-
Pargman & De Jesus, 1987	?	?	?	+	?	+	?
Peluso et al., 2005	?	?	-	+	?	-	-
Peynirciglu et al., 2000	?	?	?	+	?	-	-
Pie et al., 1996	?	?	?	?	?	+	-
Rodgers et al., 1991	-	-	?	+	?	-	-

Sarafrazi, et al., 2012	-	-	-	+	?	+	-
Savoy, et al., 1996	-	-	-	?	?	+	-
Seabourne et al., 1984	?	?	?	+	?	-	-
Senecal, et al., 2008	?	?	-	-	?	-	-
Shambrook & Bull, 1997	-	-	?	+	?	-	-
Sheard & Golby, 2006	-	-	-	+	?	-	-
Shoenfelt & Griffith, 2008	-	-	?	+	?	-	-
Short, et al. 2002	?	?	-	+	?	+	-
Smith & Holmes, 2004	?	?	?	+	?	+	?
Smith et al., 2001	?	?	?	+	?	+	?
Smith et al., 2007	?	?	?	+	?	+	?
Straub, 1989	?	?	-	+	?	+	-
Swain & Jones, 1995	-	-	-	+	?	-	-
Tahmasebi et al., 2014	?	?	?	+	?	+	?
Taylor & Shaw, 2002	?	?	?	+	?	-	-
Tenenbaum, et al., 1999	?	?	-	+	?	-	-
Terry et al., 1995	?	?	?	+	?	-	-
Theodorakis, 1995	-	-	-	+	?	-	-
Theodorakis, 1996	-	-	-	+	?	-	-
Theodorakis et al., 2001	?	?	?	+	?	+	?
Theodorakis et al., 2000	?	?	?	+	?	+	?
Tod et al., 2009	?	?	?	+	?	+	?
Van Gyn et al., 1990	?	?	-	+	?	+	-
Van Raalte et al., 1995	?	?	?	+	?	+	?
Weina et al., 2012	?	?	?	-	?	+	-
Weinberg et al. 2012	?	+	-	+	?	+	-
Weinberg et al. 1987	?	?	?	+	?	-	-
Weinberg et al., 1983	?	?	-	+	?	+	-
Weinberg et al., 1981	-	-	-	+	?	+	-
White & Hardy 1996	?	?	?	+	?	+	?
Williams et al., 2013	?	?	?	+	?	+	?

Woolfolk et al., 1985	?	?	-	?	?	+	-
Zervas & Kakkos, 1995	?	?	?	+	?	+	?
Zimmerman & Kitsantas, 1996	?	?	-	-	?	+	-
Zourbanos et al., 2013	?	?	?	+	?	+	?
Zourbanos et al., 2013	?	?	?	+	?	+	?

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Appendix D: Factor Loadings for Competition 4- items- TOPS2

Subscale	Item	Estimate	Error
Goal setting	Q6. During competition I set specific result goals for myself.	0.740	0.022
	Q16. I evaluate whether I achieve my competition goals.	0.688	0.026
	Q17. I set very specific goals for competition.	0.872	0.015
	Q26. I set personal performance goals for a competition.	0.860	0.016
Self-talk	Q15. I have specific cue words or phrases that I say to myself to help my		
	performance during competition.	0.698	0.025
	Q20. I say things to myself to help my competitive performance.	0.777	0.021
	Q22. I manage my self-talk effectively during competition.	0.797	0.019
	Q33. I talk positively to myself to get the most out of competitions.	0.786	0.020
Imagery	Q12. I visualize my competition going exactly the way I want it to go.	0.701	0.025
	Q21. At competitions, I rehearse the feel of my performance in my	0.803	0.019
	imagination.	0.781	0.020
	Q31. I imagine my competitive routine before I do it at a competition.	0.867	0.015
	Q35. I rehearse my performance in my mind at competitions.		
Negative Thinking	Q7. My self-talk during competition is negative.	0.769	0.021
	Q9. During competition I have thoughts of failure.	0.763	0.022
	Q19. I keep my thoughts positive during competitions.	0.787	0.021
	Q32. I imagine screwing up during a competition.	0.682	0.027
Emotional Control	Q37. My emotions keep me from performing my best at competitions.	0.819	0.017
	Q38. My emotions get out of control under the pressure of competition.	0.843	0.015
	Q45. I have difficulty with my emotions at competitions.	0.899	0.012
	Q48. I have difficulty controlling my emotions if I make a mistake at		
	competitions.	0.736	0.022
Activation	Q44. I can get myself ready to perform when I am at competitions.	0.787	0.019
	Q53. I can psych myself to perform well in competitions.	0.757	0.021
	Q58. I can get my intensity levels just right for competition.	0.799	0.018
	Q63. I can get myself "up" if I feel flat at a competition.	0.756	0.021
Relaxation	Q41. I use relaxation techniques as a coping strategy at competitions.	0.893	0.012
	Q54. I use relaxation techniques during competitions to improve my		
	performance.	0.899	0.012
	Q57. If I'm starting to "lose it" at a competition, I use a relaxation		0.016
	technique.	0.828	0.027
	Q61. I relax myself before competition to get ready to perform.	0.625	
Automaticity	Q40. I can allow the whole skill or movement to happen naturally in		
	competition without concentrating on each part.	0.747	0.025
	Q56. I am able to perform skills at competition without having to		
	consciously think about them.	0.803	0.022
	Q60. I am able to trust my body to perform skills in competition.	0.762	0.023
	Q62. In competition, I am sufficiently prepared to be able to perform on		
	automatic pilot.	0.665	0.028
Attention Control	Q49. I need to monitor all the details of each move in order to		
	successfully	0.733	0.024
	execute skills in practice.	0.763	0.021
	Q51. I am able to control distracting thoughts during competition.	0.818	0.018
	Q64. I focus my attention effectively during competition.	0.807	0.019
	Q67. I have trouble maintaining concentration during competition.		

Note. Factor loadings are good. All factor loadings are significant at p < .001.

Appendix E: Factor Loadings for Practice 4-items- TOPS2

Subscale	Item	Estimate	Error
Goal setting	Q1. I set realistic but challenging goals for practice.	0.770	0.021
	Q23. I set goals to help me use practice time effectively.	0.835	0.017
	Q30. I have very specific goals for practice.	0.845	0.017
	Q34. I don't set goals for practices, I just go out and do it.	-0.718	0.024
Imagery	Q3. During practice I visualize successful past performances.	0.712	0.027
	Q8. I rehearse my performance in my mind before practice.	0.664	0.029
	Q24. At practice, when I visualize my performance, I imagine what it will feel like.	0.743	0.026
	Q39. At practice, when I visualize my performance, I imagine watching myself as if on a video replay.	0.662	0.029
Attention Control	Q4. My attention wanders while I am training.	0.765	0.024
	Q13. I am able to control distracting thoughts when I am training.	-0.687	0.028
	Q25. During practice I focus my attention effectively.	-0.722	0.026
	Q28. I have trouble maintaining my concentration during long practices.	0.750	0.024
Self-talk	Q2. I say things to myself to help my practice performance.	0.702	0.026
	Q11. I manage my self-talk effectively during practice.	0.710	0.026
	Q27. I motivate myself to train through positive self-talk.	0.785	0.022
	Q29. I talk positively to myself to get the most out of practice.	0.752	0.024
Activation	Q42. I can psych myself to perform well in practice.	0.607	0.031
	Q52. I have difficulty getting into an ideal performance state during		0.031
	training.	0.657	0.032
	Q55. I can get myself "up" if I feel flat at practice.	-0.615	0.033
	Q68. I can get my intensity levels just right for practice.	-0.624	
Emotional Control	Q14. I get frustrated and emotionally upset when practice does not go	0.655	0.031
	well.	-0.722	0.028
	Q36. I can control my emotions when things are not going well at	0.748	0.026
	practice.		0.026
	Q50. My emotions keep me from performing my best during practice.	0.732	
	Q65. My practice performance suffers when something upsets me at training.		
Automaticity	Q18. At practice, I can allow the whole skill or movement to happen naturally without concentrating on each part.	0.677	0.029
	Q43. I am able to perform skills at practice without having to consciously think about them.	0.783	0.025
	Q47. I need to monitor all the details of each move in order to successfully execute skills in practice.	-0.499	0.037
	Q59. During practice, I can perform automatically without having to consciously control each movement.	0.817	0.023
Relaxation	Q5. I practise using relaxation techniques at workouts.	0.826	0.018
	Q10. I use practice time to work on my relaxation technique.	0.798	0.019
	Q46. During training sessions I use relaxation techniques to improve my performance.	0.859	0.016
	Q66. I use workouts to practise relaxing.	0.696	0.025

Factor loadings are good. All factor loadings are significant at $p < .001$.

Appendix F: Standardized item loadings and error terms for merged 4-item competition subscales

Subscale	Item	Estimate	Error
Goal setting	Q6. During competition I set specific result goals for myself.	0.747	0.019
	Q16. I evaluate whether I achieve my competition goals.	0.694	0.021
	Q17. I set very specific goals for competition.	0.841	0.014
	Q26. I set personal performance goals for a competition.	0.819	0.015
Self-talk	Q15. I have specific cue words or phrases that I say to myself to help my performance during competition.	0.657	0.023
	Q20. I say things to myself to help my competitive performance.	0.750	0.019
	Q22. I manage my self-talk effectively during competition.	0.783	0.017
	Q33. I talk positively to myself to get the most out of competitions.	0.786	0.017
Imagery	Q12. I visualize my competition going exactly the way I want it to go.	0.672	0.022
	Q21. At competitions, I rehearse the feel of my performance in my	0.806	0.016
	imagination.	0.795	0.016
	Q31. I imagine my competitive routine before I do it at a competition.	0.857	0.013
	Q35. I rehearse my performance in my mind at competitions.		
Negative Thinking	Q7. My self-talk during competition is negative.	0.727	0.021
	Q9. During competition I have thoughts of failure.	0.710	0.022
	Q19. I keep my thoughts positive during competitions.	-0.762	0.019
	Q32. I imagine screwing up during a competition.	0.656	0.024
Emotional Control	Q37. My emotions keep me from performing my best at competitions.	0.805	0.016
	Q38. My emotions get out of control under the pressure of competition.	0.829	0.015
	Q45. I have difficulty with my emotions at competitions.	0.895	0.012
	Q48. I have difficulty controlling my emotions if I make a mistake at competitions.	0.724	0.022
Activation	Q44. I can get myself ready to perform when I am at competitions.	0.775	0.019
	Q53. I can psych myself to perform well in competitions.	0.744	0.021
	Q58. I can get my intensity levels just right for competition.	0.788	0.018
	Q63. I can get myself “up” if I feel flat at a competition.	0.743	0.021
Relaxation	Q41. I use relaxation techniques as a coping strategy at competitions.	0.895	0.012
	Q54. I use relaxation techniques during competitions to improve my performance.	0.899	0.012
	Q57. If I’m starting to “lose it” at a competition, I use a relaxation technique.	0.829	0.016
	Q61. I relax myself before competition to get ready to perform.	0.653	0.027
Automaticity	Q40. I can allow the whole skill or movement to happen naturally in competition without concentrating on each part.	0.740	0.025
	Q56. I am able to perform skills at competition without having to consciously think about them.	0.797	0.022
	Q60. I am able to trust my body to perform skills in competition.	0.755	0.024
	Q62. In competition, I am sufficiently prepared to be able to perform on automatic pilot.	0.657	0.028
Attention Control	Q49. I need to monitor all the details of each move in order to		
	successfully	0.722	0.024
	execute skills in practice.	-0.753	0.021
	Q51. I am able to control distracting thoughts during competition.	-0.809	0.018
	Q64. I focus my attention effectively during competition.	0.798	0.019
	Q67. I have trouble maintaining concentration during competition.		

Note. Factor loadings are good. All factor loadings are significant at $p < .001$.

Appendix G: Standardized item loadings and error terms for merged 3-item competition subscales

Subscale	Item	Estimate	Error
Goal setting	Q6. During competition I set specific result goals for myself.	0.759	0.019
	Q17. I set very specific goals for competition.	0.850	0.015
	Q26. I set personal performance goals for a competition.	0.811	0.017
Self-talk	Q20. I say things to myself to help my competitive performance.	0.731	0.020
	Q22. I manage my self-talk effectively during competition.	0.790	0.018
	Q33. I talk positively to myself to get the most out of competitions.	0.792	0.018
Imagery	Q21. At competitions, I rehearse the feel of my performance in my imagination.	0.801	0.016
	Q31. I imagine my competitive routine before I do it at a competition.	0.800	0.016
	Q35. I rehearse my performance in my mind at competitions.	0.867	0.014
Negative Thinking	Q7. My self-talk during competition is negative.	0.733	0.021
	Q9. During competition I have thoughts of failure.	0.663	0.024
	Q19. I keep my thoughts positive during competitions.	-0.793	0.019
Emotional Control	Q37. My emotions keep me from performing my best at competitions.	0.807	0.016
	Q38. My emotions get out of control under the pressure of competition.	0.837	0.015
	Q45. I have difficulty with my emotions at competitions.	0.887	0.014
Activation	Q44. I can get myself ready to perform when I am at competitions.	0.779	0.019
	Q53. I can psych myself to perform well in competitions.	0.738	0.022
	Q58. I can get my intensity levels just right for competition.	0.792	0.019
Relaxation	Q41. I use relaxation techniques as a coping strategy at competitions.	0.902	0.012
	Q54. I use relaxation techniques during competitions to improve my performance.	0.900	0.012
	Q57. If I'm starting to "lose it" at a competition, I use a relaxation technique.	0.830	0.016
Automaticity	Q56. I am able to perform skills at competition without having to consciously think about them.	0.708	0.026
	Q60. I am able to trust my body to perform skills in competition.	0.788	0.023
	Q62. In competition, I am sufficiently prepared to be able to perform on automatic pilot.	0.667	0.029
Attention Control	Q51. I am able to control distracting thoughts during competition.	-0.745	0.022
	Q64. I focus my attention effectively during competition.	-0.828	0.018
	Q67. I have trouble maintaining concentration during competition.	0.752	0.022

Factor loadings are good. All factor loadings are significant at $p < .001$.

Appendix H: Standardized item loading and error terms for merged 4-item practice subscales

Subscale	Item	Estimate	Error
Goal setting	Q1. I set realistic but challenging goals for practice.	0.719	0.020
	Q23. I set goals to help me use practice time effectively.	0.799	0.017
	Q30. I have very specific goals for practice.	0.841	0.015
	Q34. I don't set goals for practices, I just go out and do it.	-0.682	0.022
Imagery	Q3. During practice I visualize successful past performances.	0.683	0.024
	Q8. I rehearse my performance in my mind before practice.	0.670	0.024
	Q24. At practice, when I visualize my performance, I imagine what it will feel like.	0.745	0.021
	Q39. At practice, when I visualize my performance, I imagine watching myself as if on a video replay.	0.665	0.024
Attention Control	Q4. My attention wanders while I am training.	0732	0.022
	Q13. I am able to control distracting thoughts when I am training.	-0.655	0.025
	Q25. During practice I focus my attention effectively.	-0.723	0.023
	Q28. I have trouble maintaining my concentration during long practices.	0.663	0.025
Self-talk	Q2. I say things to myself to help my practice performance.	0.674	0.023
	Q11. I manage my self-talk effectively during practice.	0.706	0.022
	Q27. I motivate myself to train through positive self-talk.	0.774	0.019
	Q29. I talk positively to myself to get the most out of practice.	0.732	0.021
Activation	Q42. I can psych myself to perform well in practice.	0.592	0.033
	Q52. I have difficulty getting into an ideal performance state during training.	-0.611	0.031
	Q55. I can get myself "up" if I feel flat at practice.	0.617	0.031
	Q68. I can get my intensity levels just right for practice.	0.639	0.030
Emotional Control	Q14. I get frustrated and emotionally upset when practice does not go well.	0.640 -0.723	0.032 0.028
	Q36. I can control my emotions when things are not going well at practice.	0.742	0.027
	Q50. My emotions keep me from performing my best during practice.	0.726	0.027
	Q65. My practice performance suffers when something upsets me at training.		
Automaticity	Q18. At practice, I can allow the whole skill or movement to happen naturally without concentrating on each part.	0.685	0.029
	Q43. I am able to perform skills at practice without having to consciously think about them.	0.789	0.024
	Q47. I need to monitor all the details of each move in order to successfully execute skills in practice.	-0.499	0.037
	Q59. During practice, I can perform automatically without having to consciously control each movement.	0.819	0.023
Relaxation	Q5. I practise using relaxation techniques at workouts.	0.804	0.018
	Q10. I use practice time to work on my relaxation technique.	0.787	0.018
	Q46. During training sessions I use relaxation techniques to improve my performance.	0.858	0.016
	Q66. I use workouts to practise relaxing.	0.688	0.025

Note. Factor loadings are good. All factor loadings are significant at $p < .001$.

Appendix I: Standardized item loading and error terms for merged 3-item practice subscales

Subscale	Item	Estimate	Error
Goal setting	Q1. I set realistic but challenging goals for practice.	0.734	0.020
	Q23. I set goals to help me use practice time effectively.	0.801	0.017
	Q30. I have very specific goals for practice.	0.813	0.017
Imagery	Q3. During practice I visualize successful past performances.	0.667	0.026
	Q8. I rehearse my performance in my mind before practice.	0.673	0.026
	Q24. At practice, when I visualize my performance, I imagine what it will feel like.	0.746	0.023
Attention Control	Q4. My attention wanders while I am training.	0.678	0.026
	Q13. I am able to control distracting thoughts when I am training.	-0.673	0.027
	Q25. During practice I focus my attention effectively.	-0.751	0.025
Self-talk	Q2. I say things to myself to help my practice performance.	0.665	0.023
	Q11. I manage my self-talk effectively during practice.	0.732	0.021
	Q29. I talk positively to myself to get the most out of practice.	0.697	0.022
Activation	Q42. I can psych myself to perform well in practice.	0.661	0.031
	Q55. I can get myself “up” if I feel flat at practice.	0.626	0.033
	Q68. I can get my intensity levels just right for practice.	0.648	0.031
Emotional Control	Q36. I can control my emotions when things are not going well at practice.	0.686	0.031
	Q50. My emotions keep me from performing my best during practice.	-0.762	0.029
	Q65. My practice performance suffers when something upsets me at training.	-0.728	0.029
Automaticity	Q18. At practice, I can allow the whole skill or movement to happen naturally without concentrating on each part.	0.675	0.030
	Q43. I am able to perform skills at practice without having to consciously think about them.	0.808	0.026
	Q59. During practice, I can perform automatically without having to consciously control each movement.	0.808	0.026
Relaxation	Q5. I practise using relaxation techniques at workouts.	0.789	0.019
	Q10. I use practice time to work on my relaxation technique.	0.794	0.019
	Q46. During training sessions I use relaxation techniques to improve my performance.	0.867	0.017

Note. Factor loadings are good. All factor loadings are significant at $p < .001$.

Appendix J: CFA Correlation matrix for Thomas 4-item subscales

	PG	PI	PAC	PST	PA	PEC	PAU	PR	CG	CI	CAC	CST	CA	CEC	CAU	CR	CNT
PG	1.000																
PI	.682	1.000															
PAC	.483	.325	1.000														
PST	.660	.647	.420	1.000													
PA	.629	.518	.749	.637	1.000												
PEC	.186	.119	.463	.291	.594	1.000											
PAU	.195	.223	.341	.239	.472	.345	1.000										
PR	.445	.595	.190	.609	.412	.173	.096	1.000									
CG	.668	.516	.338	.514	.480	.120	.174	.278	1.000								
CI	.501	.856	.188	.549	.469	.178	.164	.457	.592	1.000							
CAC	.396	.387	.615	.432	.555	.444	.306	.187	.493	.456	1.000						
CST	.510	.613	.298	.891	.505	.286	.166	.598	.559	.681	.533	1.000					
CA	.434	.439	.391	.543	.699	.487	.346	.302	.532	.603	.832	.718	1.000				
CEC	.222	.251	.370	.331	.453	.759	.234	.152	.290	.334	.681	.464	.736	1.000			
CAU	.259	.305	.315	.342	.467	.374	.748	.205	.411	.415	.647	.465	.774	.537	1.000		
CR	.359	.502	.154	.582	.384	.200	.108	.847	.320	.496	.279	.699	.447	.268	.330	1.000	
CNT	.367	.375	.434	.488	.543	.586	.262	.334	.403	.457	.719	.659	.786	.773	.600	.455	1.000

Note. Letters starting with P have Practice subscales and those starting with C have competition subscales: G = goal setting, I = imagery, AC = attention control, ST = self-talk, A = activation, EC = emotional control, A = automaticity, R = relaxation and NT = negative thinking.

Appendix K: ESEM Correlation matrix for 4 item TOPS 2 Thomas data

	PG	PI	PAC	PST	PA	PEC	PAU	PR	CG	CI	CAC	CST	CA	CEC	CAU	CR	CNT
PG	1																
PI	0.57	1															
PAC	0.174	0.014	1														
PST	0.567	0.565	0.059	1													
PA	0.499	0.294	0.387	0.431	1												
PEC	0.18	0.039	0.203	0.211	0.409	1											
PAU	0.229	0.178	0.087	0.244	0.389	0.318	1										
PR	0.375	0.55	0.067	0.528	0.202	0.125	0.071	1									
CG	0.645	0.502	0.036	0.511	0.383	0.084	0.195	0.265	1								
CI	0.427	0.869	0.11	0.481	0.296	0.094	0.142	0.435	0.584	1							
CAC	0.366	0.331	0.483	0.362	0.429	0.375	0.302	0.102	0.437	0.375	1						
CST	0.382	0.505	0.062	0.912	0.222	0.154	0.115	0.51	0.49	0.566	0.315	1					
CA	0.312	0.326	0.147	0.387	0.57	0.342	0.222	0.222	0.415	0.485	0.596	0.467	1				
CEC	0.198	0.205	0.127	0.304	0.282	0.75	0.235	0.111	0.277	0.272	0.581	0.341	0.519	1			
CAU	0.237	0.277	0.022	0.331	0.323	0.311	0.75	0.172	0.416	0.387	0.553	0.345	0.624	0.494	1		
CR	0.282	0.444	0.113	0.499	0.232	0.131	0.08	0.847	0.287	0.442	0.169	0.582	0.338	0.206	0.276	1	
CNT	0.289	0.265	0.156	0.351	0.389	0.543	0.226	0.254	0.311	0.309	0.54	0.416	0.536	0.653	0.477	0.322	1

Appendix L: Correlation matrix for merged 3-item subscales (Thomas & Lane's data)

	PG	PI	PAC	PST	PA	PEC	PAU	PR	CG	CI	CAC	CST	CA	CEC	CAU	CR	CNT
PG	1.000																
PI	.685	1.000															
PAC	.540	.368	1.000														
PST	.687	.692	.485	1.000													
PA	.660	.567	.720	.670	1.000												
PEC	.182	.089	.484	.299	.536	1.000											
PAU	.210	.258	.305	.249	.485	.317	1.000										
PR	.467	.572	.206	.582	.438	.146	.156	1.000									
CG	.708	.553	.358	.522	.493	.093	.175	.334	1.000								
CI	.513	.905	.246	.595	.529	.135	.175	.467	.566	1.000							
CAC	.423	.430	.599	.452	.535	.462	.293	.205	.503	.446	1.000						
CST	.545	.642	.382	.925	.533	.245	.154	.513	.581	.656	.571	1.000					
CA	.458	.457	.431	.537	.672	.430	.335	.278	.514	.552	.864	.697	1.000				
CEC	.182	.174	.326	.260	.307	.732	.172	.073	.212	.190	.662	.372	.677	1.000			
CAU	.314	.357	.360	.346	.532	.383	.735	.263	.424	.398	.719	.472	.830	.499	1.000		
CR	.378	.484	.183	.549	.427	.162	.145	.849	.348	.488	.300	.630	.403	.173	.353	1.000	
CNT	.367	.352	.412	.501	.467	.549	.235	.338	.395	.394	.705	.644	.736	.695	-.630	.424	1.000

Note. Letters starting with P have Practice subscales and those starting with C have competition subscales: G = goal setting, I = imagery, AC = attention control, ST = self-talk, A = activation, EC = emotional control, A = automaticity, R = relaxation and NT = negative thinking.

Appendix M: Factor correlations for merged 4-item subscales (Thomas & Lane's data)

	PG	PI	PAC	PST	PA	PEC	PAU	PR	CG	CI	CAC	CST	CA	CEC	CAU	CR	CNT
PG	1.000																
PI	.649	1.000															
PAC	.489	.309	1.000														
PST	.639	.657	.443	1.000													
PA	.629	.499	.757	.625	1.000												
PEC	.150	.018	.427	.197	.550	1.000											
PAU	.176	.223	.264	.207	.440	.270	1.000										
PR	.455	.571	.193	.560	.415	.133	.136	1.000									
CG	.708	.562	.334	.555	.492	.073	.185	.354	1.000								
CI	.487	.892	.223	.600	.474	.073	.169	.468	.606	1.000							
CAC	.388	.364	.627	.433	.546	.392	.263	.184	.467	.429	1.000						
CST	.512	.618	.331	.920	.485	.195	.126	.542	.584	.662	.505	1.000					
CA	.436	.423	.409	.549	.705	.429	.321	.296	.523	.565	.824	.690	1.000				
CEC	.193	.159	.365	.252	.411	.739	.180	.095	.210	.213	.643	.361	.684	1.000			
CAU	.253	.295	.289	.325	.450	.306	.757	.229	.403	.384	.613	.413	.752	.471	1.000		
CR	.366	.490	.167	.563	.384	.151	.124	.841	.369	.494	.269	.666	.436	.202	.332	1.000	
CNT	.346	.306	.438	.454	.522	.555	.226	.327	.375	.385	.697	.580	.758	.721	.565	.437	1.000

Note. Letters starting with P have Practice subscales and those starting with C have competition subscales: G = goal setting, I = imagery, AC = attention control, ST = self-talk, A = activation, EC = emotional control, A = automaticity, R = relaxation and NT = negative thinking.

Appendix N: List of scales with subscales and matching items of TOPS 2

TOPS 2 Subscales

Practice

Goal Setting – items 1, 23, 30, 34R
Imagery – items 3, 8, 24, 39
Attention Control – items 4R, 13, 25, 28R
Self-talk – items 2, 11, 27, and 29
Activation – items 42, 52R, 55, 68
Emotional Control – items 14R, 36, 50R, 65R
Automaticity – items 18, 43, 47R, 59
Relaxation – items 5, 10, 46, 66

Competition

Goal Setting – items 6, 16, 17, 26
Self-talk – items 15, 20, 22, 33
Imagery – items 12, 21, 31, 35
Negative Thinking – items 7, 9, 19R, 32
Emotional Control – items 37R, 38R, 45R, 48R
Activation – items 44, 53, 58, 63
Relaxation – items 41, 54, 57, 61
Automaticity – items 40, 56, 60, 62

Attention Control – items 49R, 51, 64, 67R

Note. The shaded numbers are the items removed from the subscales

Appendix O: TOPS 2 competition and practice item comparisons

Subscale	**Identical Items**	**Similar items**	**Different items**
Goal setting	17—30	6-17	1, *16* ,23, 26, 34
Self-Talk	2-20; 11-22; 29-33		*15, 27*,
Imagery	8-35	21-24, 8-31	3, *12*, *39*
Attention Control	4-*49*; 13-51; 25-64	*28*-67	
Activation	42-53; 58-68; 55-*63*		44, *52*
Emotional Control	50-37		*14*, 36, 65, 38, 45, *48*
Automaticity	18-*40*; 56-43	18-43	*47*, 59, 60, 62
Relaxation		5-10	5, 10, *61*, 57, 41, *66*
Negative Thinking		9-32	7, 9, 19, *32*

Note. The table above show the items that are identical, similar to each other or unique.

Appendix P: Psychological Strengths Questionnaires

All information supplied will be kept strictly confidential.

FIRST NAME:	**LAST NAME:**	**AGE:**	**(years)**	**(mths)**	**DATE:**	**/**	**/**
SPORT:		**Sch**					

PLEASE READ ALL INSTRUCTIONS FIRST FOR EACH SECTION OF THE QUESTIONNAIRE

This is not a test - there is no right or wrong answers.

Your answers are confidential and will only be used for research or program development. Your answers will not be used in any way to refer to you as an individual.

Please do not leave any statements blank. If unsure, please **ASK FOR HELP**.

TEST OF PERFORMANCE STRATEGIES ©

P

S

Office Use: Data Code (club initial, first and surname, initials, day & month of birth)

This questionnaire measures performance strategies used by athletes in various sport situations. Because individual athletes are very different in their approach to their sport, we expect the responses to be different. All that is required is for you to be open and honest in your responses.

Throughout the questionnaire, several terms are used which may have different meanings for different individuals. Because of this, these terms are defined below with specific examples to sport where appropriate. Please keep these definitions in mind when responding to items with these terms.

COMPETITION: a tournament/meet where individuals or teams perform against each other.

SKILL: a specific element of your sport performance. For example, free throw shooting in basketball or a jump in figure skating.

PERFORMANCE: your execution of specific sport skills during training and competition.

ROUTINE: a set of behaviours that is performed regularly in preparation for your performance in sport. An example may be going through specific stretches while listening to a song on your walkman prior to every performance.

WORKOUT: a structured practice session to work on various elements of your sport.

VISUALIZATION/IMAGERY/REHEARSAL: these terms refer to the act of picturing in your mind some aspect of your performance. An example would be seeing and feeling yourself execute a specific skill perfectly.

Test of Performance Strategies (TOPS 2-S)

Each of the following items describes a specific situation that you may encounter in your training and competition. Please fill in the circle (●) that best describes how frequently these situations apply to you.

	Never	Rarely	Some times	Often	Always
1. I set realistic but challenging goals for practice.	1	2	3	4	5
2. I say things to myself to help my practice performance.	1	2	3	4	5
3. During practice I visualize successful past performances.	1	2	3	4	5
4. My attention wanders while I am training.	1	2	3	4	5
5. I practice using relaxation techniques at workouts.	1	2	3	4	5
6. During competition I set specific result goals for myself.	1	2	3	4	5
7. My self-talk during competition is negative.	1	2	3	4	5
8. I rehearse my performance in my mind before practice.	1	2	3	4	5
9. During competition I have thoughts of failure.	1	2	3	4	5
10. I use practice time to work on my relaxation technique.	1	2	3	4	5
11. I manage my self-talk effectively during practice.	1	2	3	4	5
12. I am able to control distracting thoughts when I am training.	1	2	3	4	5
13. I set very specific goals for competition.	1	2	3	4	5
14. At practice, I can allow the whole skill or movement to happen naturally without concentrating on each part.	1	2	3	4	5
15. I keep my thoughts positive during competitions.	1	2	3	4	5
16. I say things to myself to help my competitive performance.	1	2	3	4	5
17. At competitions, I rehearse the feel of my performance in my imagination.	1	2	3	4	5
18. I manage my self-talk effectively during competition.	1	2	3	4	5

19. I set goals to help me use practice time effectively.	1	2	3	4	5
(TOPS 2-S) Continued…..	**Never**	**Rarely**	**Some times**	**Often**	**Always**
20. At practice, when I visualize my performance, I imagine what it will feel like.	1	2	3	4	5
21. During practice I focus my attention effectively.	1	2	3	4	5
22. I set personal performance goals for a competition.	1	2	3	4	5
23. I talk positively to myself to get the most out of practice.	1	2	3	4	5
24. I have very specific goals for practice.	1	2	3	4	5
25. I imagine my competitive routine before I do it at a competition.	1	2	3	4	5
26. I talk positively to myself to get the most out of competitions.	1	2	3	4	5
27. I rehearse my performance in my mind at competitions.	1	2	3	4	5
28. I can control my emotions when things are not going well at practice.	1	2	3	4	5
29. My emotions keep me from performing my best at competitions.	1	2	3	4	5
30. My emotions get out of control under the pressure of competition.	1	2	3	4	5
31. I use relaxation techniques as a coping strategy at competitions.	1	2	3	4	5
32. I can psych myself to perform well in practice.	1	2	3	4	5
33. I am able to perform skills at practice without having to consciously think about them.	1	2	3	4	5
34. I can get myself ready to perform when I am at competitions.	1	2	3	4	5
35. I have difficulty with my emotions at competitions.	1	2	3	4	5
36. During training sessions I use relaxation techniques to improve my performance.	1	2	3	4	5
37. My emotions keep me from performing my best during practice.	1	2	3	4	5
38. I am able to control distracting thoughts during competition.	1	2	3	4	5
(TOPS 2-S) Continued…..	**Never**	**Rarely**	**Some times**	**Often**	**Always**

39. I can psych myself to perform well in competitions.	1	2	3	4	5
40. I use relaxation techniques during competitions to improve my performance.	1	2	3	4	5
41. I can get myself "up" if I feel flat at practice.	1	2	3	4	5
42. I am able to perform skills at competition without having to consciously think about them.	1	2	3	4	5
43. If I'm starting to "lose it" at a competition, I use a relaxation technique.	1	2	3	4	5
44. I can get my intensity levels just right for competition.	1	2	3	4	5
45. During practice, I can perform automatically without having to consciously control each movement.	1	2	3	4	5
46. I am able to trust my body to perform skills in competition.	1	2	3	4	5
47. In competition, I am sufficiently prepared to be able to perform on automatic pilot.	1	2	3	4	5
48. I focus my attention effectively during competition.	1	2	3	4	5
49. My practice performance suffers when something upsets me at training.	1	2	3	4	5
50. I have trouble maintaining concentration during competition.	1	2	3	4	5
51. I can get my intensity levels just right for practice.	1	2	3	4	5

EASDQ Instrument

For each sentence, please choose the answer that best describes you. *Colour ONE circle in each line* ***(●).*** *Please* ***DO NOT*** *leave any answers blank.*

	False		Neutral			True
1. I am a most skilled athlete in my best sport/event.	1	2	3	4	5	6
2. My technical skills in my best sport/event are better than most at my level of competition.	1	2	3	4	5	6
3. I recognize myself as very skillful in my best sport/event.	1	2	3	4	5	6

4. Coaches and competitors at my level of competition see me as very skillful in my best sport/event.	1	2	3	4	5	6
5. I excel in my best sport/event because of my skill level.	1	2	3	4	5	6
6. Coaches and competitors at my level, see me as a very focused competitor in my best sport/event.	1	2	3	4	5	6
7. I am mentally able to motivate myself appropriate to the situation when necessary.	1	2	3	4	5	6
8. I am mentally able to focus my attention on the appropriate things when performing in my best sport/event.	1	2	3	4	5	6
9. In my best sport/event I consistently perform to the level of my ability.	1	2	3	4	5	6
10. My performance in my best sport/event is particularly good for important competitions.	1	2	3	4	5	6
11. My performance in my best sport/event consistently meets my goals or expectations.	1	2	3	4	5	6
12. I am consistently able to give my best overall performance in my best sport/event.	1	2	3	4	5	6
13. I excel at my best sport/event because I am able to give a peak performance when necessary.	1	2	3	4	5	6
14. I am consistently able to 'pull it all together' (e.g. skills, physiological, body, and the mental side of things) when performing in my best sport/event.	1	2	3	4	5	6

Mental Toughness Questionnaire (MTI) S-F

Please fill in the circle (●) that best describes your opinion.

	Not at All True			Somewhat True				Very True
1. I am fully committed to achieving the goals I have set myself.	1	2	3	4	5	6	7	8

2. I am good at keeping stress in perspective.	1	2	3	4	5	6	7	8
3. I focus on the task without getting distracted.	1	2	3	4	5	6	7	8
4. When faced with difficulty I keep working at it and won't accept defeat.	1	2	3	4	5	6	7	8
5. Overall I am mentally tough.	1	2	3	4	5	6	7	8
6. My commitment to my goals is strong.	1	2	3	4	5	6	7	8
7. I minimise the impact that stress and pressure has on me.	1	2	3	4	5	6	7	8
8. I get absolutely focused on the task, nothing distracts me.	1	2	3	4	5	6	7	8
9. I keep working at things until I overcome them.	1	2	3	4	5	6	7	8
10. I excel because of my mental strength.	1	2	3	4	5	6	7	8
11. No matter what, I remain committed to my goals.	1	2	3	4	5	6	7	8
12. I am good at minimising the effects of stress.	1	2	3	4	5	6	7	8
13. I don't get distracted. I keep focused on the task.	1	2	3	4	5	6	7	8
14. I keep on persisting until the job is done.	1	2	3	4	5	6	7	8
15. I know I have great mental strength.	1	2	3	4	5	6	7	8

SHORT Flow State Scale (S FSS)

Please answer the following questions in relation to your experience in the event or activity you have just completed. These questions relate to the thoughts and feelings you may have experienced while taking part. There are no right or wrong answers.

Think about how you felt during the event/activity, then fill in the circle ***(●)*** that best describes your opinion for each question.

During the event of *(name event)*:________________________	Never	Rarely	Some times	Often	Always
1. I felt I was competent enough to meet the demands of the situation.	1	2	3	4	5
2. I did things spontaneously and automatically without having to think.	1	2	3	4	5
3. I had a strong sense of what I wanted to do.	1	2	3	4	5
4. I had a good idea about how well I was doing while I was involved in the task/activity.	1	2	3	4	5
5. I was completely focused on the task at hand.	1	2	3	4	5
6. I had a feeling of total control over what I was doing.	1	2	3	4	5
7. I was not worried about what others may have been thinking of me.	1	2	3	4	5
8. The way time passed seemed to be different from normal.	1	2	3	4	5
9. I found the experience extremely rewarding.	1	2	3	4	5

Life Effectiveness Questionnaire

Please fill in the circle (●) that best describes your opinion.

	Not like me							*Like me*
	Not at All True			**Somewhat True**				**Very True**
1. I am successful in social situations.	1	2	3	4	5	6	7	8
2. I change my thinking or opinions easily if there is a better idea.	1	2	3	4	5	6	7	8
3. I can stay calm in stressful situations.	1	2	3	4	5	6	7	8
4. I like to be busy and actively involved in things.	1	2	3	4	5	6	7	8
5. I am competent in social situations.	1	2	3	4	5	6	7	8
6. I am open to new ideas.	1	2	3	4	5	6	7	8

7. I stay calm and overcome anxiety in new or changing situations.	1	2	3	4	5	6	7	8
8. I like to be active and energetic.	1	2	3	4	5	6	7	8
9. I communicate well with people.	1	2	3	4	5	6	7	8
10. I am adaptable and flexible in my thinking and ideas.	1	2	3	4	5	6	7	8
11. I stay calm when things go wrong.	1	2	3	4	5	6	7	8
12. I like to be an active ‘get into it’ person.	1	2	3	4	5	6	7	8

Thank you for completing this questionnaire

Appendix Q: Parallel worded and quasi parallel items

Q17. I set very specific goals for competition.	Q30. I have very specific goals for practice
Q20. I say things to myself to help my competitive performance	Q2. I say things to myself to help my practice performance
Q21. At competitions, I rehearse the feel of my performance in my Imagination	Q24. At practice, when I visualize my performance, I imagine what it will feel like
Q22. I manage my self-talk effectively during competition	Q11. I manage my self-talk effectively during practice
Q33. I talk positively to myself to get the most out of competitions	Q29. I talk positively to myself to get the most out of practice
Q35. I rehearse my performance in my mind at competitions	Q8. I rehearse my performance in my mind before practice
Q37. My emotions keep me from performing my best at competitions	Q50. My emotions keep me from performing my best during practice
Q54. I use relaxation techniques during competitions to improve my Performance	Q46. During training sessions I use relaxation techniques to improve my Performance
Q51. I am able to control distracting thoughts during competition	Q13. I am able to control distracting thoughts when I am training
Q53. I can psych myself to perform well in competitions	Q42. I can psych myself to perform well in practice
Q56. I am able to perform skills at competition without having to consciously think about them	Q43. I am able to perform skills at practice without having to consciously think about them
Q58. I can get my intensity levels just right for competition	Q68. I can get my intensity levels just right for practice
Q64. I focus my attention effectively during competition	Q25. During practice I focus my attention effectively

Appendix R: Reliability estimates for all competition and practice subscales for study 1 and study 3

Subscale	4 item Comp	3 item comp	3 item comp-FJ	4 item prac	3 item prac	3 item prac-FJ
GS	.863	.865	.644	.869	.855	.740
ST	.839	.828	.734	.826	.788	.733
I	.864	.856	.662	.789	.748	.658
AC	.858	.823	.508	.817	.766	.466
A	.857	.825	.698	.718	.686	.757
EC	.893	.890	.602	.804	.764	.605
AU	.826	.768	.683	.782	.801	.729
R	.888	.907	.751	.873	.866	.758
NT	.834	.813	.385			
Mean	.858	.842	.644	.810	.784	.680
Median	.858	.828	.662	.811	.777	.731

Note. 4 item comp = competition items from the TOPS 2; 3 item comp = competition items from the TOPS 2 short form (secondary data); 3 item comp-FJ = competition items from TOPS 2S Fiji data; 4 item prac = practice items from TOPS 2; 3 item prac = practice items from the TOPS 2 short form (secondary data); 3 item prac-FJ = practice items from TOPS 2S Fiji data, GS = Goal setting, ST = Self-talk, I = Imagery, AC = Attention Control, A = Activation, EC = Emotional Control, AU = Automaticity, R = Relaxation, NT = Negative Thinking.

Appendix S: CFA correlation matrix for TOPS 2S subscales for Fiji data

	PG	PI	PAC	PST	PA	PEC	PAU	PR	CG	CI	CAC	CST	CA	CEC	CAU	CR	CNT
PG	1																
PI	0.871	1															
PAC	0.896	0.914	1														
PST	0.908	0.953	0.877	1													
PA	0.850	0.832	0.868	0.875	1												
PEC	0.997	1.093	1.085	1.033	1.117	1											
PAU	0.737	0.752	0.729	0.764	0.870	1.039	1										
PR	0.689	0.744	0.792	0.782	0.765	1.102	0.748	1									
CG	0.980	0.868	0.858	0.840	0.809	0.906	0.670	0.610	1								
CI	0.814	0.986	0.823	0.929	0.876	1.056	0.775	0.740	0.754	1							
CAC	0.880	0.882	0.973	0.864	0.986	1.244	0.780	0.770	0.865	0.843	1						
CST	0.832	0.884	0.843	0.936	0.852	1.007	0.757	0.750	0.832	0.969	0.917	1					
CA	0.816	0.880	0.829	0.841	1.019	1.039	0.863	0.720	0.808	0.837	0.965	0.874	1				
CEC	0.280	0.358	0.306	0.328	0.320	0.441	0.402	0.380	0.286	0.338	0.296	0.327	0.310	1			
CAU	0.736	0.828	0.737	0.785	0.897	1.006	0.947	0.700	0.728	0.804	0.966	0.832	0.969	0.282	1		
CR	0.761	0.746	0.750	0.808	0.833	1	0.813	1	0.629	0.788	0.827	0.811	0.826	0.389	0.769	1	
CNT	0.066	0.082	0.091	0.008	0.04	0.41	0.333	0.29	0.198	0.148	0.004	0.005	0.025	0.502	0.078	0.235	1

Note. Letters starting with P have Practice subscales and those starting with C have competition subscales: G = Goal Setting, I = Imagery, AC = Attention Control, ST = Self-Talk, A = Activation, EC = Emotional Control, A = Automaticity, R = Relaxation and NT = Negative Thinking.

Appendix T: The MST Intervention

A half day workshop was conducted to train the coaches on the mental skills training program. Coaches went through experiential learning process whereby they tried these exercises. The workshop adopted an interactive approach and coaches were encouraged to give input and feedback throughout the process. After the conclusion of each session a robust discussion was generated on their personal experiences and how they would use these techniques with their football players. This workshop was conducted at Fiji Football Academy. The duration of the workshop was approximately 4.5 hours including 30 minutes break after first two sessions.

Program Schedule

Time	Activity/Exercise	Purpose	Method
8.45-9,00	Coach registration	Keep coaches' attendance record	
9.00-9.10	Overview of mental skills training and its importance in enhancing player performance	To inform coaches of importance of mental skills training	Lecture
9.10-9.25	Teaching relaxation topic: Deep Breathing	Coaches experience the importance of deep breathing exercises in sport	Lecture/Exercise: Explanation & demonstration with coach participation
9.25-9.45	Teaching: Progressive muscle relaxation technique	Coaches experience a relaxed state and learn its significance	Lecture/Exercise: Explanation & demonstration with coach participation
9.45-10.05	Discussion on their experience and how coaches could implement these techniques within their training.	To get a feedback on coaches' experiences and helping coaches prepare a plan to introduce this concept to their players	Interactive discussion
10.05-10.10	Break		
10.10-10.20	Overview of mental imagery	To inform coaches the significance of mental imagery in	

		enhancing sports performance.	
10.20-10.45	Exercise 1: Teach mental imagery Exercise 2: Combine breathing with mental imagery	Coaches get to experience the technique and understand its significance	Lecture/Exercise
10.45-11.00	Discussion on their experience and how coaches could implement these techniques within their training.	To get a feedback on coaches' experiences and helping coaches prepare a plan to introduce this concept to their players	Interactive/ Discussion
11.00-11.30	Tea Break		
11.30-11.40	Overview of self-talk	To inform coaches on the significance of self-talk in sports	Lecture
11.40-12.05	Exercise 1: Teach self-talk strategies Exercise 2: Combine previously learned skills with self-talk	Coaches get to experience the technique and understand its significance	Lecture/Exercise
12.05-12.25	General discussion on coaches' experience and how coaches could implement these techniques within their training.	Get coaches feedback and collectively plan on implementation of these strategies as single as well as multicomponent strategy	Interactive discussion
12.25-12.30	Break		
12.30-12.40	Overview of goal setting	Inform coaches on importance of goal setting in sports	Lecture
12.40-1.00	Exercise 1: Teach goal setting strategies Exercise 2: Coaches combining other strategies with goal setting	Coaches experience this technique and use in combination with other techniques learned in this program	Lecture/Exercise
1.00-1.15	General discussion on coaches' experience and planning to use goal setting	Get coaches feedback and collectively plan on implementation of goal setting as well incorporating in	Interactive discussion

		multicomponent strategy	
1.15-1.30	General discussion on how coaches may be able to implement these strategies with their respective teams	Coaches leave with some ideas and a tentative plan to implement this program	Discussion

Relaxation (script)

Relaxation affects both the mind and the body. Proper relaxation allows automatic function and optimal performance. Strategies used during the workshop

- Simple breathing exercise: can be practiced during training and in all settings
    - ❖ Inhale on the count of four and exhale on the count of four.
    - ❖ Do not rush the counting; maintain regular breathing with the counting.
    - ❖ Breathe in and out through the nose.
- Progressive Muscle Relaxation (Bernstein, Borkovic, & Hazlett-Stevens, 2000). - can be practiced in all settings, especially at home. It is tensing and releasing of 16 muscle groups adapted as a technique for stress management. McCallie, Blum and Hood (2006) recommended maintaining tension approximately five seconds and then relax for ten seconds. The suggested order is:

(1) Dominant hand and forearm. Make a fist with your hand (2). Non-dominant hand and forearm. (3). Dominant upper arm. Bring your right forearm up to “make a muscle”. (4). Non-dominant upper arm upper arm. (5). Forehead. Raise your eyebrows as high as you can. (6). Upper cheeks and nose. Squeeze your nose and tight jaw. (7). Lower cheeks and jaws. Open your mouth as wide as you can, as you might when you‘re yawning. (8). Neck and throat. Be careful as you tense these muscles. Pull your head back slowly as though you are looking up to the ceiling. (9). Chest, Shoulders and Upper back. Bring your

shoulders up towards your ears and push your shoulder blades back push your chest forward. (10). Abdominal and stomach. Breathe in deeply and fill up your lungs with air. (11). Dominant thigh. Tighten your thigh. (12). Dominant lower leg. Slowly and carefully tense to avoid cramps. (13). Dominant foot. Curl your toes downwards. (14). Non-dominant thigh. Repeat as other leg. (15). Non-dominant lower leg. Repeat as other leg. (16). Non-dominant foot. Repeat as for other foot.

Goal Setting

Coaches learned the processes of goal setting to successfully work with players. Conscious goals and intentions govern a player's actions and how well they perform. Goal setting looks at how behaviour is initiated. Through this process there is an assumption that players become self-directional, autonomous, decision makers and taking personal responsibility for planning achievement.

Process of Goal setting (points for coaches to consider when implanting this program)

- Find time at the training ground and engage in goal-setting processes of the players-simply ask questions and listen**.**
- Be mindful that they operate in the hierarchy of football club. Coaches need to question if it is safe and accepted for players to share their personal goals or to engage in dialogue with coach.
- Coaches need to understand their own goal and priorities
- Recognise the culture of the football workplace
- Coaches should recognise that in striving to achieve any goals, the cultural and social climates within which the player lives must be balanced with personal aspirations of the players.

Steps: (Coaches were to help players formulate their own goals)

- **Outcome goals:**
    - *Big goals (This could be the team goal or their personal goal)*
- **Performance goals:**
    - All about performance
    - Not the result
    - Measurable
    - Under the influence of sportsperson
    - Helps achieve outcome goals
- **Process goals:**
    - smaller
    - Very specific
    - Meet performance goals
    - Breakdown performance goal

Points to consider:

- Write goals down and monitor regularly
- Use short term goals to achieve long-range goals
- Goals are internalised by players

Mental Imagery

Imagery training as a sports skill is like performing the skill. The players experience the action in their mind. They will be required to use as many senses as possible to see and feel a successful execution of football skill or action, such as, dribbling, shooting, recovery from a poor first touch, a successful pass from a fist touch and winning the ball from the opposition and passing it to teammate. Imagery can be practised anytime and anywhere. With daily practice a player can sharpen his/her performance.

Each player will be asked to develop many game specific scenarios with all aspects of imagery.

- Generally, when relaxed a player may be able to focus better on imagery. It is useful but not necessary to practice relaxation techniques before using imagery.
- Replicate actual playing actions and conditions such as, the intensity of the game, quick recovery from mistakes (player's and team) and set plays.
- External or internal imagery- players can develop or chose their own style.
- Use as many senses as possible to see and feel.
- Use trigger words, such as "delay", "angle of passing" & "support player"
- Daily practice is necessary to get full benefits of this skill.
- Integrate into the player's regular training program.

The players consider the probability of the occurrence of the situation during the game and anticipate the opposition's action and use imagery to respond to that situation. The players can then vary the intensity of the game in their mind and respond accordingly to gain control of the situation. The player must gain tactical superiority using imagery over the situation. They can anticipate the subsequent actions that result from their response.

Self-Talk

Positive Self-talk Script

Undue attention on past or future actions can become a distraction from your performance. This can bring about unnecessary stress and anxiety. Self-talk can have a huge impact on your ability to handle the anxiety and stress and often determine how you perform in an activity.

Coach activity

Coaches' brain- storm some of the thoughts (both negative and positive) that may occur before during and after the game determine how they may be able to encourage the change from negative to positive thoughts for their players.

Instructional self-talk

Pick a scenario: Goal keeper has the ball during play. How would the coaches want the players to react? Coaches discuss in pairs the instructional self- talk the players can use to effectively put themselves in attacking formation. The coaches can take this example and use the processes during their normal training and encourage players to use self-talk. There are no set words or phrases. Players will be encouraged to use strategies that they are comfortable with.

Through coaches input a list of phrases will be generated as a guide. The important factor here is the process rather than the actual phrase.

Motivational self-talk

The coaches can encourage the players to use these and other self-talk that positively motivate them to perform better. Again, with coaches input a list of sample phrases will be generated which will be provided to all coaches and players.

Sample phrases:

I can do it, I am strong and capable, I am calm and confident.

When you make a mistake say statements that will help you feel confident. For example:

- Let it go - move on, play aggressive and get the ball back.
- It's okay, next one.
- Play my game, I've got this
- Relax, I can do this
- I got this
- I am confident
- I am in control
- I am a champion and a winner
- I am calm and relaxed
- I am prepared

Appendix U: Fiji data Factor Loadings for Psychological Strengths subscales

Self-Concept	**Items**	**Factor Loading -T1 Stay**	**Factor Loading-T1T2 Stay**	**Life Effectiveness**	**Items**	**Factor Loading -T1 Stay**	**Factor Loading-T1T2 Stay**
Skill	1	.707	.687	Social Competence	1	.789	.783
	2	.646	.631		5	.758	.778
	3	.718	.717		9	.705	.722
	4	.648	.649	Intellectual Flexibility	2	.707	.718
	5	.629	.639		6	.729	.720
Mental Self Concept	6	.520	.534		10	.699	.694
	7	.662	.678	Emotional Control	3	.660	.676
	8	.684	.715		7	.763	.793
	9	.616	.626		11	.650	.665
Overall Performance	10	.655	.652	Active Initiative	4	.651	.650
	11	.646	.659		8	.753	.753
	12	.697	.708		12	.756	.786
	13	.652	.631				
	14	.649	.664				
Mental Toughness							
Goal commitment	1	.671	.685				
	6	.735	.735				
	11	.686	.696				
Stress Minimization	2	.643	.645				
	7	.683	.719				
	12	.795	.793				
Mental Self-Concept	5	.705	.690				
	10	.794	.838				
	15	.723	.743				
Task Focus	3	.634	.650				
	8	.742	.793				
	13	.759	.766				
Perseverance	4	.699	.705				
	9	.738	.727				
	14	.750	.862				

Appendix V: Descriptive statistics for practice and competition factors at Wave 1 to Wave 2 control and intervention groups

		M1	SD1	M2	SD2
Practice					
Goal Setting	Control	3.70	.81	3.66	.77
	Experimental*	3.75	1.02	3.90	.74
Imagery	Control	3.68	.75	3.50	.77
	Experimental*	3.73	1.00	3.74	.75
Attention-	Control	3.51	.79	3.32	.68
Control	Experimental*	3.50	.78	3.55	.71
Self- Talk	Control	3.77	.82	3.66	.74
	Experimental	3.90	.87	3.81	.70
Activation	Control	3.61	.79	3.80	.72
	Experimental	3.71	.10	3.71	.90
Emotional -	Control	3.00	.71	2.91	.71
Control	Experimental	3.02	.63	2.89	.73
Automaticity	Control	3.44	.86	3.57	.81
	Experimental	3.41	.93	3.67	.93
Relaxation	Control	3.09	.87	3.36	.87
	Experimental	3.53	.92	3.72	.90
Competition					
Goal setting	Control	3.86	.85	3.66	.79
	Experimental	3.94	1.01	3.85	.89
Imagery	Control	3.56	.79	3.56	.74
	Experimental	3.68	.92	3.71	.89
Attention -	Control	3.36	.76	3.36	.68
Control	Experimental*	3.70	.71	3.60	.59
Self-Talk	Control	3.62	.86	3.59	.80

	Experimental	3.74	.98	3.81	.80
Activation	Control	3.89	.75	3.65	.82
	Experimental	3.86	1.05	3.80	.92
Emotional	Control	3.08	.73	3.04	.63
Control	Experimental	3.16	.68	3.07	.65
Automaticity	Control	3.67	.77	3.67	.75
	Experimental	3.87	.92	3.72	.96
Relaxation	Control	3.21	.86	3.32	.92
	Experimental*	3.33	1.00	3.69	.80
Negative	Control	2.36	.87	2.67	.81
Thinking	Experimental	2.28	.79	2.47	.92

Appendix W: Descriptive statistics for self-concept, mental toughness, life effectiveness and flow

		M1	SD1	M2	SD2
EASDQ factors					
Self- Concept	Control	4.28	0.90	4.33	0.88
	Experimental	4.18	0.92	4.16	1.15
Mental	Control	4.61	0.89	4.34	0.87
Self-Concept	Experimental	4.58	0.95	4.47	0.95
Overall	Control	4.62	0.85	4.50	0.83
Performance	Experimental	4.62	0.91	4.59	0.97
Mental Toughness					
Goal	Control	5.94	1.39	5.71	1.49
Commitment	Experimental	6.24	1.52	6.03	1.58
Stress	Control	5.44	1.54	5.72	1.51
Minimization	Experimental	5.97	1.45	5.80	1.47
Mental	Control	5.80	1.54	5.62	1.47
Self-concept	Experimental	6.04	1.55	5.88	1.63
Task Focus	Control	5.73	1.59	5.77	1.46
	Experimental	5.86	1.59	5.80	1.72
Perseverance	Control	6.04	1.66	5.67	1.47
	Experimental	6.18	1.49	5.95	1.53
Life Effectiveness					
Social	Control	5.97	1.56	5.67	1.48
Competence	Experimental	6.27	1.42	6.14	1.41
Intellectual	Control	6.07	1.46	5.86	1.41
Flexibility	Experimental*	6.25	1.38	6.28	1.49

Emotional	Control	5.68	1.68	5.76	1.40
Control	Experimental*	5.74	1.37	6.14	1.55
Active	Control	6.38	1.40	6.04	1.29
Initiative	Experimental	6.42	1.43	6.22	1.57
Flow					
Challenge Skill	Control	3.68	0.96	3.44	1.09
Balance	Experimental	3.80	0.93	3.67	1.06
Loss of Self-	Control	3.44	1.07	3.64	0.98
Consciousness	Experimental	3.59*	1.02	3.64	1.07
Clear Goals	Control	3.94	0.88	3.75	0.92
	Experimental	3.96	0.90	3.90	1.05
Action	Control	3.93	1.11	3.81	0.99
Awareness	Experimental	3.94*	0.94	4.07	0.96
Task	Control	3.75	1.16	3.86	0.93
Concentration	Experimental	3.97	0.95	3.95	1.06
Sense of	Control	3.78	1.04	3.78	0.92
Control	Experimental	3.76*	0.88	4.00	0.90
Unambiguous	Control	3.79	1.10	3.89	0.99
Feedback	Experimental	3.41*	1.33	3.89	1.11
Time	Control	3.54	1.05	3.76	1.04
Transformation	Experimental	3.71*	1.11	3.98	0.94
Autotelic	Control	4.09	1.03	3.97	0.99
Experience	Experimental	3.88*	1.19	3.91	1.18

Note: M1- M3 = mean for wave 1- wave 3; SD 1- SD3 = their standard deviations

Appendix X: Coaches volunteered for the interview process

Participants Pseudonyms	Sex	School Pseudonyms	Role	Coaching Experience (Yrs)
AD	M	DS	Teacher/Coach	10
JS	M	SC	Teacher/Coach	6
JT	M	TH	Teacher/Coach	9
MA	M	ADP	Teacher/Coach	6
NC	M	CC	Teacher/Coach	7
NL	M	LAS	Teacher/Coach	9
NN	M	NC	Teacher/Coach	10
PV	M	VC	Teacher/Coach	6
RL	M	LM	Teacher/Coach	8
SR	M	BS	Teacher/Coach	7
SK	M	BSC	Teacher/Coach	7