

UNIVERSITY OF WINCHESTER

An Investigation into the Relationship Between Diving, Self-Efficacy and
Performance in Competitive Diving

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Doctorate of Philosophy

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for a postgraduate research degree of the University of Winchester.

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UNIVERSITY OF WINCHESTER

ABSTRACT

An Investigation into the Relationship Between Diving, Self-Efficacy and Performance in Competitive Diving

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Springboard and highboard diving is a sport of moments. Having the slightest performance advantage in diving can make the difference between winning a gold medal or not even making the top 10. One method of psychological performance enhancement used extensively throughout the sporting domain is self-efficacy theory, which refers to an athlete's perceptions about their ability to perform a task or cope with a situation. Self-efficacy based interventions have been used in many sports including rugby, tennis, gymnastics and swimming to enhance performance and reduce competition anxiety. Little is known about self-efficacy within the sport of diving. The current programme of research initially used qualitative investigation to establish the uses and attitudes towards self-efficacy in different samples of current and retired divers. The first study of this thesis used focus groups of competitive divers to discover 12 themes that corresponded with the five sources of self-efficacy highlighted by Bandura (1977) and Feltz, Short and Sullivan (2008). The second study expanded on these findings by using in depth interviews with retired divers to highlight four main facilitators and four main barriers to overcoming mental block in diving. Before any quantitative research could commence there was a need for the development of a diving specific self-efficacy measure, as no current scale existed. Initial testing deemed the DIVE-SE scale reliable for use with divers over the age of 12 years old ($\alpha = .89$), subsequent testing validated the scale for divers as young as 9 years old ($\alpha = .86$). The fourth study suggested a positive effect on ability level and certain sources of self-efficacy, with higher ability divers having higher levels of social persuasion ($F(1,175) = 30.69, P < .001$) and physiological/emotional states ($F(1,175) = 12.41, p = .001$) than their lower ability counterparts. The fifth aimed to explore the potential self-efficacy performance relationship within a competitive age group diving sample. Only physiological/emotional state statistically significantly predicted total competition score ($F(1,16) = 5.977, p = .027, R^2 = .285$) and only in 12 – 13 year old divers. The final study of the current programme of research aimed to improve training performance and reduce anxiety in adolescent divers using an arousal re-appraisal intervention. A multiple case study design was used with three divers, all three case studies demonstrated an improvement in performance and self-efficacy levels, and two divers showed a reduction in training anxiety. The current programme of research provides in depth knowledge into self-efficacy within a diving context, and has produced both a measurement tool and performance enhancing intervention for applied use within the sport of diving. Further research could aim to address the potential influences of self-efficacy and diving on athlete development and mental health.

Keywords: Adolescent, Arousal Re-appraisal, Diving, Performance, Self-Efficacy

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List of Abbreviations

ASA	Amateur Swimming Association
BBC	British Broadcasting Corporation
CSAI-R2	Revised Competitive State Anxiety Inventory – 2
CSES	Climbing Self-Efficacy Scale
DIVE-SE	Diving Self-Efficacy Scale
DMSP	Developmental Model of Sports Participation
EDR	Electrodermal Response Biofeedback
FINA	Federation Internationale de Natation (International Swimming Federation)
FTEM	Foundation, Talent, Elite and Mastery Pathway
LTAD	Long Term Athlete Development
MANOVA	Multivariate Analysis of Variance
MPSES	Music Performance Self-Efficacy Scale
PAAI	Physical Activity Appraisal Inventory
SSCQ	Sources of Sports-Confidence Questionnaire
STV	Subject to Variable Ratio

'It's not the diver who looks best in warm-up who wins, advances to finals, or makes the team but, rather, the diver who best handles the stress and performs when it counts most' (Huber, 2016, p223)

This thesis reports a series of studies investigating the self-efficacy performance relationship in springboard and highboard diving, with a specific focus on the effects of physiological and emotional sources of self-efficacy on diving performance. Within a diving competition a diver has one chance to perform each dive in their competition list, in this situation a minor mistake on a single dive will have a detrimental effect on the divers cumulative score and could have a negative effect on the performance in subsequent dives potentially affecting the divers overall competition outcome. As a single mistake can have such a devastating effect on a divers competition outcome the pressure experienced by divers can be immense. The ability to cope with the psychological pressures of diving could be one of the factors that determines the difference between a medal winning performance or de-selection. It is, therefore, important to equip divers with psychological skills to not only cope but also thrive in high-pressure competition and training environments. To this end, an overarching purpose of this programme of research was to investigate self-efficacy within a diving environment for any potential performance enhancing properties.

1.1. Background and Need for the Study

Diving is a sport of moments; single chances to perform to the highest standard and a single lapse in performance can have a catastrophic effect on the cumulative competition score, potentially ending any chances of the performer winning a medal. Having the slightest performance advantage in a sport such as diving can make the difference between winning a gold medal or not even making the top 10. In the Rio 2016 Olympic Games, British divers Jack Laugher and Chris Mears won the first ever diving gold medal for the UK at an Olympic Games in the men's 3-metre synchronised diving event (BBC Sport, Aug 2016). Their historic victory came with a score of 454.32 points only 4.11 points ahead of the team from the USA. In a sport where a good dive can score between 80 and 100 points and the difference between medals can be less than 5 points, any performance advantage can make all the difference. Moreover, literary non-fiction, such as autobiographies and blogs, in diving repeatedly mentions divers experiences of pressures and stresses that are inherent in high performance diving, often resulting in poor performance, injury and in extreme cases attempted suicide

(Barrow, 2017; Boudia & Ellsworth, 2016; Daley, 2012; Louganis & Marcus, 2006; Mitcham & Writer, 2012; Russell, 2009).

One theory closely linked with increasing sporting performance and mediating psychological stress is self-efficacy (Cascio et al., 2014). Self-efficacy is an individual's belief in their ability to perform a task or cope with a situation (Bandura, 1977). Self-efficacy has been linked with positive performance outcomes in several sports, such as: billiards (Di Corrado et al., 2015); cricket (Hayes et al., 2006); football (Horn, Williams & Scott, 2002); golf (Bruton et al., 2013); marathon running (Samson, 2014); and volleyball (Barzouka, Bergeles & Hatzihristos, 2007). In a review by Stizmann and Ely (2011) self-efficacy was positively correlated with performance outcome in 93% of the 369 studies analysed. The current body of research in acrobatic sports also demonstrated a potential positive link between self-efficacy and performance. Research by Gomez-Paloma, Rio and D'anna (2014) found that higher ability gymnasts have higher levels of self-efficacy than novice gymnasts. A similar relationship between ability level and self-efficacy has also been found in dance (Kim, Im & Lee, 2015). Self-efficacy has also been proposed as a moderator of performance anxiety and fear of injury in gymnastics (De Pero et al., 2013). As sports such as gymnastics and dance have similar physical and mental demands as diving, it could be hypothesised that there may be a similar relationship between ability level, performance and self-efficacy in diving.

Unfortunately there is very limited research in recent years into self-efficacy in diving. There is a body of older research investigating self-efficacy within diving. A study by Feltz and Mugno (1983) found beginner divers suggested psychological and affective states had the greatest influence on their diving performance. Another study by Highlen and Bennett (1983) aimed to compare qualifying and non-qualifying elite divers with qualifying and non-qualifying elite wrestlers to assess the psychological factors influencing performance in open-skill and closed-skill sports. Despite finding limited differences between the groups the study did find that qualifying elite divers had higher levels of self-confidence than non-qualifiers. Limited studies have also aimed to address increasing self-efficacy and performance in diving using mastery experience (Slobounov et al., 1997) and social persuasion (Carter, 1986).

Comparison across studies of diving self-efficacy is difficult due to the vastly different methodologies and measurement tool used. The several studies that measured self-efficacy or self-confidence within diving used a variety of different generic self-efficacy or self-confidence measure (Carter, 1986; Feltz & Mugno, 1983; Highlen & Bennett, 1983; Slobounov et al., 1997). Without consistency in methodology and measurement comparison and review of different studies of diving self-efficacy will remain very difficult.

Another potentially worrying trend highlighted by diving research is the potential psychological stresses and pressures of diving and aquatic sports. Recent research studies have found worrying effects of abuse (Marks, Mountjoy & Marcus, 2011) and disordered eating (Merlin et al., 2014) within high-level aquatic sport at FINA competitions. In addition, a study by Coyle, Gorczyński and Gibson (2017) found that knowledge of mental health and associated warning signs and symptoms was very low within divers, and that the support systems to provide help and advice for diver suffering with mental health problems were very limited. Furthermore, the guidelines and suggestions for mental health support and performance enhancement using psychology are practically non-existent across many diving governing bodies (British Diving, 2005; Diving Australia, 2012; 2016; Diving Plongeon Canada, 2017; Diving New Zealand, 2013). Limited research has shown that self-efficacy may mediate the effects of psychological stresses (Cascio et al., 2014). However, without a working knowledge of self-efficacy specific to diving, a suitable set of guidelines, measures and applied interventions it will remain difficult for coaches and team managers to provide a suitable, safe diving environment that can promote positive mental health and increased performance.

The presented programme of research aimed to investigate the impact, development, and understanding of self-efficacy in diving utilising a number of divers drawn from different ability levels. The underlying attitudes and opinions relating to diving pressures and stressors were also investigated in an attempt to illustrate if the opinions of current competitive divers are in line with the opinions detailed in the autobiographies of current and retired elite divers. In addition, the current programme of research sought to clarify the self-efficacy performance relationship in diving, with a view to facilitating the development and implementation of suitable support systems

and applied interventions specific to divers. Finally, the current programme of research also sought to develop a diving specific self-efficacy scale to enhance the quantification of self-efficacy levels in divers and to improve the ecological validity and transferability of future diving research.

Three major outcomes were predicted from the presented programme of research. First, provide context and articulate with greater clarity the links between self-efficacy, performance, and psychological pressures in diving. Second, to develop a diving specific self-efficacy scale to enhance the transferability, comparability and ecological validity of future diving research. Finally, to develop a diving specific self-efficacy intervention that can be used in an applied setting by coaches and divers to enhance performance and self-efficacy.

1.2. Research Questions and Hypotheses

Question one

What are the current opinions and attitudes towards self-efficacy and performance stressors in competitive divers?

Question two

What are the perceived barriers and facilitators to diving performance?

Question three

What is the hierarchy of importance of the sources of self-efficacy in international sample of competitive divers?

Hypothesis one

Physiological and emotional states will be the most important source of self-efficacy in diving.

Question four

Does self-efficacy level predict performance outcome in diving?

Hypothesis two

Divers with higher levels of self-efficacy will achieve better performance outcomes than divers with lower levels of self-efficacy.

Question five

Does an arousal re-appraisal intervention improve a divers perceived performance, anxiety and self-efficacy levels?

Hypothesis three

The implementation of an arousal re-appraisal intervention into a training environment will improve training performance and self-efficacy levels whilst reducing anxiety towards new and complex skills.

1.3. Structure of the Thesis

The current thesis contains six studies that can be read in isolation or as part of a larger research journey.

Chapter two offers a concise overview and evaluation of the current literature in relation to self-efficacy, performance, athlete development and the sport of diving. Also included is a detailed evaluation of the current approach of British Diving in relation to mental health and applied psychological support for divers when compared with other international diving governing bodies. In addition, the insights of literary non-fiction from current and retired divers are included. Special consideration is given to the design, strengths and limitations of the existing research.

Chapter three details the philosophical and methodological decisions and approaches used within the current thesis. The contents of chapter two allow the reader to understand the methodological approach and theoretical framework of each study, allowing for ease in reading and understanding. The detailed explanation of each research approach, data collection method and data analysis technique will provide further support for the reader when considering the approaches used in the individual studies.

The aim of chapter four is to detail the methodological approach and findings of the first study: a qualitative investigation into self-efficacy in a diving context. In addition the chapter includes a discussion of the findings in relation to the hypothesis one.

Chapter five provides the details of the second study: self-efficacy and mental block in diving, another qualitative study with a participant group of retired divers. In addition the chapter includes a discussion of the findings in relation to the hypothesis two.

The findings of the third study: the development and validity testing of the DIVE-SE scale are presented in chapter six. The chapter details the process of item development and validity testing of a new diving specific self-efficacy scale. In addition, the chapter includes a table of averages from an international sample of divers that can be used for diagnostics when evaluating responses of the DIVE-SE scale.

Chapter seven details the methodological approach and findings of the fourth study: the sources of self-efficacy in an international diving sample, which is an investigation of the hierarchy of the sources of self-efficacy within diving from a qualitative perspective. In addition the chapter includes a discussion of the findings in relation to the hypothesis three.

Within chapter eight is the findings of the fifth study: the self-efficacy performance relationship in competitive age group divers, which explores if self-efficacy can be used to predict performance in competitive divers. Moreover, the chapter includes a discussion of the findings in relation to hypothesis four.

The sixth study of the current thesis: self-efficacy and diving performance an arousal re-appraisal intervention, is detailed within chapter nine. The chapter includes the analysis and interpretation of several athlete case studies using an arousal re-appraisal intervention within a diving training environment. The discussion centres on research questions and hypothesis five.

Chapter ten details the general discussion of all six individual research studies in relation to each other, the existing research and the potential implications of the

research findings. Discussion of the strengths and limitations of each study along with methodological reflections are also included.

Concluding remarks, practical applications and future research directions are detailed in chapter eleven. The chapter includes the applications of the research undertaken in the current thesis from both an academic and applied perspective.

In addition, audit trails for each individual study and case study databases for each individual case study are included in separate appendices. A full copy of the DIVE-SE scale is also included in a separate appendix.

This chapter is a comprehensive review of the current literature pertaining to the self-efficacy performance relationship in sport, with a particular focus on springboard and highboard diving. For clarity the review comprises of six main sections. Initially an overview of self-efficacy theory and the sources of self-efficacy in relation to sports performance are provided. The review then details the current methods of measuring and analysing self-efficacy, followed by a detailed review of the potential benefits of self-efficacy on the psychological development and wellbeing of athletes. The review then provides the current opinions and findings related to enhancing self-efficacy within sport. Also, in an attempt to provide further clarity to the contents of the following thesis an overview of the sport of springboard and highboard diving is included for those who may not have specific knowledge of the sport. While springboard and highboard diving is the main sporting focus of this academic work, the scope of the literature review is more generalised to include literature that addresses the themes of the research questions despite the specific context. The review was conducted to act as a basis for the development of unique primary research. Collating and critically analysing existing research provides an overview of the research topic, as well as informing the development of suitable research methodologies in the area of self-efficacy theory and sport.

2.1. Introduction

Sport in its essence is a competitive, physically demanding endeavour (Kent, 2006), and one defining characteristics of an elite athlete is the drive for precision and perfection in their performance (Hays, 2012). Diving requires athletes to strive for perfection by performing acrobatically complex skills whilst plummeting towards water from great heights, where one minor slip or hint of self-doubt can result in catastrophe and potentially serious injury (Huber, 2016). As if coping with the risk of injury and cognitively complex skills (Schack, 2004) is not enough, as diving is an 'early entry' sport most divers are coping with these pressures in childhood and adolescence (British Diving, 2016).

Several different theories and models in psychology aim to address the links between motivation, behaviour and performance outcome. Constructs such as the theory of reason action, the theory of planned behaviour and the protection motivation theory have all been used within a sporting setting to address sport and exercise behaviours (Brewer et al., 2003; Godin, 1994; Hausenblas, Carron & Mack, 1997). However, one major weakness of these theories is the dependence on logical behaviour and analytic truths (Ogden, 2003), leaving little scope to address irrational thought processing and behaviour. One theory that allows for the exploration of both rational and irrational thought processes is self-efficacy theory (Bandura, 1977).

2.2. Self-Efficacy Overview

Self-efficacy theory was initially developed by Albert Bandura in 1977, as part of his formative work developing social-cognitive theory. In social cognitive theory people are not seen as simply reacting to environmental stimuli, but as proactive agents in control of their motivations, beliefs, actions and emotions. Social cognitive theory proposes three main factors that act in a reciprocal process to form our motivations and behaviours. Bandura (1977) proposes that environmental conditions influence behaviour, which in turn influences personal factors, which can then in turn influence environmental conditions. To give a sporting example; an audience's reaction (environmental condition) may increase an athletes self-belief (personal factor) which will in turn increase their effort (agentic behaviour), and as a result of this process the audiences reaction (environmental condition) may change, beginning the whole process again. Agentic behaviour refers to the concept of human agency, "a human action which is purposeful and intentional, and carried out at the volition of the individual or group concerned and not because of constraints imposed by a social structure" (Kent, 2006 p22). Self-efficacy is an integral part of social-cognitive theory and influences agentic behaviours.

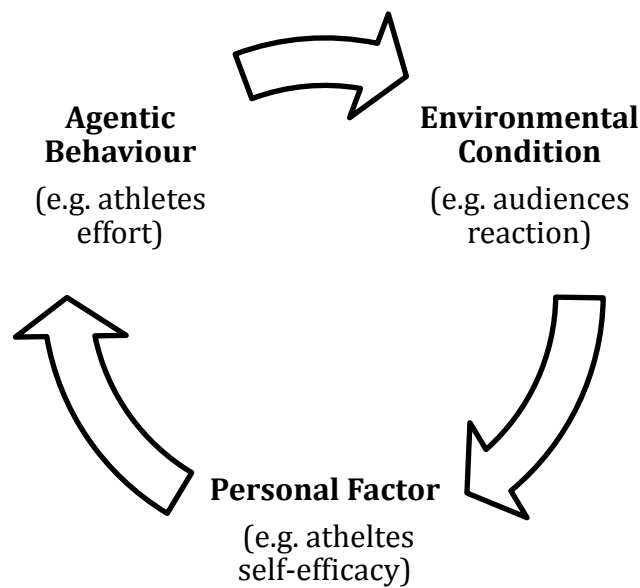


Figure 1: Illustration of athlete’s behaviour within social cognitive theory (Bandura, 1977)

Self-efficacy is described as the beliefs one has about their ability to perform a task or cope with a situation. To date the literature suggests three dimensions to self-efficacy beliefs: level, strength and generality (Bandura, 1997). The level of the belief refers to a persons performance expectations based on the difficulty of the task. For example the amount of baskets out of ten a basketball player would estimate they could achieve would be based on the level of their self-efficacy beliefs. The strength of a self-efficacy belief is based on how much a person feels they can attain their expected performance. Two swimmers may believe they can swim 100m freestyle in 50 seconds but one athlete may have more certainty in their belief, and they would in turn have the stronger belief. The generality of the belief is the transferability of beliefs in one situation to other situation. For example a gymnast may have strong beliefs about their ability to perform a perfect front summersault on the beam, their belief would have a high level of generality if they could apply this belief to performing a front summersault in a diving pool or on a trampoline. The concept of generality is not often addressed during self-efficacy studies (Maddux, 1995). The lack of research in the area of generality of self-efficacy beliefs could be due to the practise of early specialisation within sport, which will be explored later in the review.

To avoid confusion it is important to explain that self-efficacy is not a synonym for self-confidence or self-esteem (Bandura, 1997) as some research does use the term in this way. Self-confidence is a wider colloquial term for people's ability to trust themselves, more specifically a person's belief in their ability to engage with their environment (Woodman & Hardy, 2003). Self-confidence encompasses several other constructs. Self-efficacy is described by Bandura (1977) as the belief in one's conviction to perform the appropriate behaviour to achieved the desired outcome, and so is often described as situationally specific self-confidence (Feltz, 1988b). Whereas, self-esteem has been defined as a persons' emotional evaluation of their self-worth (Smith & Mackie, 2007), people may consider themselves to be highly skilled and self-confident but not have the associated positive self-worth (Feltz, 1988b). Often in sporting literature various terms, such as self-confidence, self-efficacy self-esteem and perceived ability are used interchangeably. Often self-confidence is conceptualised as self-efficacy (Bandura, 1997; Feltz, 1988b) and other times seen as a more encompassing construct that includes elements of self-efficacy, self-esteem and self-concept (Vealey, 1986; Vealey et al., 1998). For the purposes of this review self-confidence is seen as a wider encompassing term in which self-efficacy is one element.

Social-cognitive theory suggests that self-efficacy beliefs are state specific and not globally specific or a type of personality trait (Bandura, 1997). Self-efficacy beliefs are derived from the complex interpretation of a myriad of sources of information through self-appraisal and self-persuasion. It is the interpretation of these sources of information that effect the forming self-efficacy beliefs, which in turn affect behaviour, thought patterns, emotions and motivation (Short & Ross-Stewart, 2009). Current literature suggests there are nine main forms of efficacy beliefs: Ameliorative efficacy, collective efficacy, competitive efficacy, learning efficacy, performance efficacy, preparatory efficacy, self-efficacy, self-regulatory efficacy and task efficacy. See table 1 for further details (Hays et al., 2006; Feltz, Short & Sullivan, 2008; Vealey, 2005).

Table 1: Types of Efficacy Beliefs and Definitions

Type of Efficacy	Definition	Associated Literature
Ameliorative Efficacy	The belief in ones ability to cope with a situation	Asselmann et al. (2016) Kashikar-Zuck et al. (2013) Terada et al. (2013)
Collective Efficacy	The belief in the ability of ones group to perform	Hampson & Jowett (2014) Petitta, Jiang & Palange (2015) Zumeta et al. (2015)
Competitive Efficacy	The belief in ones ability to perform against an opponent	Jurko (2013) Cular & Krstulovic (2011)
Learning Efficacy	The belief in ones ability to learn a skill	Jou, Hung & Lai (2014) Nakayama, Mutsuura & Yamamoto (2015)
Performance Efficacy	The belief in ones ability at the time of performance	Hazell, Cotterill & Hill (2014) LaForge-MacKenzie & Sullivan (2014)
Preparatory Efficacy	The belief in ones ability in a training or practise setting	McCarty (2015) Barris, Farrow & Davids (2014)
Self - Efficacy	The belief in ones own ability to perform and task or cope with a situation	Feltz, Short & Sullivan (2008) Stizmann & Ely (2011) Bandura (1977)
Self-regulatory Efficacy	The belief in ones ability to influence ones own behaviour	Critcher & Ferguson (2016) Crozier et al. (2015) Jung & Brawley, (2013)
Task Efficacy	The belief in ones ability to perform a task	Boardley, Jackson & Simmons (2015) Howle, Dimmock & Jackson (2016)

It has been suggested that a persons self-efficacy may affect the types of activities a person chooses to undertake as well as the persistence and effort a person applies to these activities (Bandura, 1997). The potential effect of self-efficacy on personal choice suggests certain activities may be more attractive to people with higher self-efficacy and others may be more prevalent with people who have lower self-efficacy. A number of research studies have highlighted a strong link between high self-efficacy and positive sports performance (Di Corrado et al., 2015; see Moritz et al., 2000 for review). A link between high self-efficacy and positive performance outcome could suggest high-level sport may be an activity favoured by people with higher self-efficacy. Self-efficacy has been comprehensively research area of sport psychology for several

decades and to date there are two main bodies of research within the self-efficacy/sport domain. The first centres around the causal relationship between self-efficacy and performance with a specific focus on the effectiveness and interaction of different sources of self-efficacy (Feltz, Short & Sullivan, 2008; Feltz et al., 1979; Feltz & Mugno, 1983). The second focuses on the effects of self-efficacy in competitive performance (Weinberg, 1985; Weinberg et al., 1979; Vealey, 2006). It is worth noting that the majority of literature investigating self-efficacy within a sporting domain focuses on the effects of self-efficacy on performance and overlooks the effects of self-efficacy on motivation, which was the original premise of the theory (Feltz, Short & Sullivan, 2008).

2.3. Sources of Self-Efficacy

Bandura (1977) posited that self-efficacy beliefs are determined by four main sources: mastery experience; vicarious experience; social persuasion; and physiological and affective states. Building upon this initial classification, Feltz, Short and Sullivan (2008) proposed the split of the influence of physiological and affective states into two separate influences: physiological states and emotional states.

2.3.1. Mastery experience. Mastery experience refers to a person's self-efficacy beliefs gained from previous experience, be it positive or negative (Sitzmann & Yeo, 2013). Many researchers see mastery experience as the most important and influential source of self-efficacy beliefs (Warner et al., 2014). In a meta-analysis Stizmann and Yeo (2013) concluded that mastery experience is primarily the product of past experience, and not necessarily the main influence of future behaviour. The current body of research supports the assertion that previous experience and exposure to similar circumstances increases self-efficacy (O et al., 2014; Valiante & Morris, 2013). Traditionally research supports the viewpoint that positive experiences have a positive effect on efficacy and negative experiences have a negative effect on efficacy (Bandura, 1997). However, acceptance of this position is not universal, some research has asserted that negative past experiences may have a motivational effect and improve self-efficacy (Sarkar, Fletcher & Brown, 2015). Past performance influences appear to be more prevalent in experienced athletes when compared to novices, the reason for this discrepancy could be due to novice athletes lacking experience to draw on so must be more dependent on other sources (Samson, 2014). A current study in golf investigated the effect of different types of mastery experience on self-efficacy in skilled and less

skilled golfers (Bruton et al., 2013). The authors findings suggest that in a pre-game situation skilled golfers gain mastery experience from handicap achievements and less skilled golfers gain mastery experience from practise satisfaction.

2.3.2. Vicarious experience. Vicarious experience refers to the self-efficacy beliefs gained from observing or modelling others, either in person or via indirect methods such as the media (Westen, Burton & Kowalski, 2008). Vicarious experience is seen as the second most influential source of self-efficacy in Bandura's (1977) model of self-efficacy theory. Research suggests when athletes watch peers of a similar level perform successfully they may form the belief they will also perform successfully, whereas if the athlete observes a peer of a much higher level fail they may form the belief that they too will fail (Feltz, Short & Sullivan, 2008). Positive effects of vicarious experience on self-efficacy have been documented in many different sports, for instance: volleyball (Barzouka, Bergeles & Hatzihristos, 2007); cricket (Hayes et al., 2006); and football (Horn, Williams & Scott, 2002). In a study by Ste-Marie et al. (2012) two groups of children aged 7 – 15 years were tasked with learning a series of trampoline skills using self-observational learning via video feedback. Interestingly the children who were in control of their video feedback were more self-efficacious than those who receive the video feedback in an experimenter controlled environment. These findings support the current views in vicarious experience research, highlighting the way feedback is delivered may have an effect on the levels of efficacy gained.

2.3.3. Social persuasion. The third influence of self-efficacy suggested by Bandura (1977) is social persuasion, otherwise referred to as verbal persuasion. Using the term verbal persuasion could lead readers to dismiss the potential effects of non-verbal social stimuli. For the purposes of this review the term social persuasion will be used to include verbal and non-verbal social influences on self-efficacy, such as body language. Social persuasion encompasses the self-efficacy beliefs gained from social interaction, for example with a coach, parent or teammate (Bandura, 1977). Studies in sport have used focus groups containing youth athletes to demonstrate the effects of parental pressure (Kanters, Bocarro & Casper, 2008) and coach pressure (Keegan et al., 2010) on self-efficacy. Research into the effects of social persuasion on self-efficacy has mainly focused on verbal feedback. Findings suggest that positive feedback enhances self-efficacy beliefs whereas negative feedback undermines self-efficacy beliefs (Woodgate

& Brawley, 2008). Pre-game speeches have been used as an effective method of enhancing athletes' self-efficacy through social persuasion (Vargas-Tonsing, 2009). In addition the influences of social persuasion on self-efficacy has been one explanation posited for the perceived home advantage experience in many sports. Findings by Gomez, Pollard and Luis-Pascual (2011) suggest that self-efficacy beliefs gained from audience feedback could affect athlete performance. Finally, negative coaching practises have been researched as a potential source of negative self-efficacy beliefs within sports. Findings in the current literature pertaining to coaching practises highlight that negative coaching practises can reduce self-efficacy and also may have a negative impact on performance (Stirling & Kerr, 2013).

2.3.4. Physiological states. The final influence of self-efficacy in Bandura's (1977) model is physiological and affective states, which has been suggested to have the weakest effect on developing self-efficacy beliefs (Barling & Snipelisky, 1983; McCormick, Ayres & Beechey, 2006). Physiological and affective states was later split into two separate influences: physiological states and emotional states (Feltz, Short & Sullivan, 2008). Physiological states refer to the influence of physical bodily reactions on the generation of self-efficacy beliefs. It is worth noting that the influence of physiological stimuli on self-efficacy is entirely in the interpretation and this interpretation can have a potentially energising or debilitating effects (Treasure, Monson & Lox, 1996). One athlete may experience an elevated heart-rate and interpret that as a physiological sign of readiness thus experiencing an increase in self-efficacy beliefs. Whereas another athlete could experience the exact same increase in heart-rate and interpret it as the feeling of nervousness thus experiencing a decrease self-efficacy beliefs. Research suggests people cognitively assess their physiological arousal and other physiological indicators and make an appraisal judgement that in turn affects their self-efficacy beliefs (Feltz, Short & Sullivan, 2008). There are several aspects of sports performance that can affect these physiological judgements, they include but are not exclusive to: pain, fatigue, arousal and fitness. It is the perception of these physiological indicators that affects an athletes' self-efficacy, and these perceptions can be unique to the individual despite the stimuli being the same. Early research highlighted the potential influence of physiological factors on self-efficacy. Feltz and Mugno (1983) found that novice divers performing their first dive perceived physiological states to be the most influential source of self-efficacy information, yet few researchers have

explored this area of study in recent years (Feltz, Short & Sullivan, 2008). This could be due to the high weighting that mastery experience carries within the body of self-efficacy research meaning other sources can be overlooked.

2.3.5. Emotional states. Emotional states refers to the influence of emotional reactions on the generation of self-efficacy beliefs and is also effected greatly by an individuals interpretation of a given emotion (Feltz, Short & Sullivan, 2008). One athlete's self-efficacy beliefs may be more greatly affected by emotions such as fear or disappointment than another athlete, based purely on how the athlete interprets the emotion. There is also a body of research supporting the influential effects of emotional state on self-efficacy. Existing research suggest that positive emotional states could increase self-efficacy beliefs and negative emotional states could decrease self-efficacy beliefs (Kavanagh & Bower, 1985; Maddux, 1995). The effects of emotional states on self-efficacy have been reported in several sports, including wheelchair road racing (Martin, 2002) and basketball (Mack & Stephens, 2000). In a study of carom billiards positive emotional states were found to significantly influence technical and cognitive self-efficacy beliefs (Di Corrado et al., 2015)

2.3.6. Hierarchy of the source of self-efficacy. In Bandura's (1977) original model the sources of self-efficacy were arranged in the order of perceived importance. Mastery experience was seen as the most influential source, followed by vicarious experience, social persuasion and finally physiological and affective states. Yet this may not be the case for every circumstance. In a qualitative investigation into the sources of self-efficacy in marathon running conducted by Samson (2014), physiological and emotional states were perceived as the most influential sources of self efficacy, followed by social persuasion, mastery experience and finally vicarious experience (Samson, 2014). In contrast, a similar qualitative investigation in the sport of golf reported mastery experiences to be perceived as the most influential source of self-efficacy followed by social persuasion, with physiological states, emotional states and vicarious experience only being mentioned sporadically (Valiante & Morris, 2013). Moreover, a study by Machida, Ward and Vealey (2012) investigated the hierarchy of influences on sports confidence using athletes from 13 different sports (basketball, diving, field hockey, American football, golf, ice hockey, ice skating, European football, softball, swimming, tennis, athletics and volleyball), reported mastery experience to be the most

influential source, followed by physiological and emotional states, social persuasion and finally vicarious experience. The differing hierarchies of influence within different sports supports the state specific nature of self-efficacy. In addition, to better understand and potentially utilise self-efficacy within a specific sport it appears necessary first to gain more state specific knowledge about the importance of each source of self-efficacy. Moreover, age may also affect the influence of certain sources on self-efficacy, with social persuasion appearing important to all ages, but mastery and vicarious experience becoming more importance during later childhood and adolescence (Chase, 1998). A more reliable understanding of the hierarchy of the sources of self-efficacy within a diving context could allow for any future measures and applied interventions to be more focused and potentially increasing the chance of a positive outcome.

2.4. The Self-Efficacy-Performance Relationship

Despite the order or hierarchy of the sources, self-efficacy appears to have a positive effect on sports performance. In a meta-analysis conducted by Stizmann and Ely (2011) self-efficacy was positively correlated with performance in 93% of studies they reviewed. Self-efficacy has been reported to be a strong predictor of sports performance in many different sports including: billiards (Di Corrado et al., 2015); cricket (Hayes et al., 2006); football (Horn, Williams & Scott, 2002); golf (Bruton et al., 2013); marathon running (Samson, 2014); and volleyball (Barzouka, Bergeles & Hatzihieristos, 2007) among others. In addition, a gender difference has been proposed in relation to sporting self-efficacy (Feltz, 1988a). A study of 7 – 10 year olds found that boys had higher sporting self-efficacy beliefs than girls (Eccles et al., 1993). In addition a study by Hardy, Hall and Hardy (2005) suggested that boys used self-talk more than girls, and individual sports athletes used self-talk more than team sports athletes.

Current research in acrobatic sports supports a positive self-efficacy performance relationship. Findings in gymnastics illustrate a positive relationship between self-efficacy and ability level in junior gymnasts, with higher-level gymnasts having higher self-efficacy than novices (Gomez-Paloma, Rio & D'anna, 2014). The authors theorise that gymnasts with higher self-efficacy are predisposed to attempting more advanced skills thus improving their ability level, and that the involvement in artistic gymnastics at a competitive level may promote and increase self-efficacy. The methodological approach used in Gomez-Paloma, Rio & D'anna (2014) was appropriate;

self-efficacy was measured using the Perceived Physical Ability Scale for Children (Colella & Morano, 2008) which is a six item likert scale measure adapted from the Physical Self-Efficacy scale (Ryckman et al., 1982). Despite not using an incremental 0 – 100 rating scale as suggested by Bandura (2006) the Perceived Physical Ability Scale for Children has an acceptable level of reliability ($\alpha = .72$) (Colella & Morano, 2008). Simplified language and carefully worded questions increase the suitability for use with a child participant sample (Borgers, Leeuw & Hox, 2000). The Perceived Physical Ability Scale for Children appears to be a suitable measure for physical self-efficacy in children, and as participants in the study by Gomez-Paloma, Rio and D'anna (2014) were female gymnasts between the ages of eight and ten years old the Perceived Physical Ability Scale for Children scale was a suitable choice of measure. In contrast, one clear weakness of the study by Gomez-Paloma, Rio and D'anna (2014) is the apparent disparity in the amount of experience between the two groups. The study uses a group of competitive gymnasts who have been involved in competitive gymnastics for three or more years and a group of recreational gymnasts who have been involved in the sport for up to one year. This difference in amount of experience could affect the development of self-efficacy beliefs and thus potentially skewing the self-efficacy measurement within the study. To ensure the validity of the findings similar studies should attempt to account for the disparity in years of experience between lower level and higher level athletes. Furthermore, a qualitative investigation by White and Bennie (2015) posited the competitive environment within the sport of gymnastics increased stress and created challenges, whereas affirmative coaching and interpersonal relationships were perceived as a positive influence to overcome failure. Similar findings are seen in many other sports (Samson, 2014; Saville et al., 2014). There has also been research to suggest that self-efficacy moderates performance anxiety and fear of injury in gymnastics (De Pero et al., 2013).

Research in dance has also reported similar findings. One example is the study by Nam-Young, Jae-Hyeon and Ho (2015) who reported a positive correlation between self-efficacy and dance ability, implying higher-level dancers having higher levels of self-efficacy. Using the accepted definition of sport, dance would not be considered a sport. The Oxford English Dictionary (Kent, 2006 p477) defines sport as “any highly structured, goal directed physical activity governed by rules, which forms a struggle with oneself or involves competition with others, but which also has some of the characteristics of

play". As many forms of dance have no competitive element dance is usually defined as a hobby, pastime or art form. However, Nam-Young, Jae-Hyeon and Ho (2015) used university students who's performances were examined and judged for the purposes of their degree so one could argue that dance in this circumstance could be defined as a sport as there is a competitive element. Moreover, even without the competitive element dance involves many of the same acrobatic and aesthetic performance elements as diving, trampolining, and gymnastics. These similarities suggest that research findings in dance could potentially be transferable to diving, trampolining, gymnastics, and other acrobatic and aesthetic based sports.

Research in extreme sports has also found a positive relationship between self-efficacy and performance behaviours. Research into the extreme sport of parkour has found that self-efficacy acts as a mediator between the stable personality traits of neuroticism and conscientiousness and risk-taking behaviour (Merritt & Tharp, 2013). Parkour, otherwise known as free running is a extreme acrobatic sport involving aerial stunts from heights using the urban environment as apparatus, such as buildings and railings (Miller & Demoiny, 2008). Qualitative findings within parkour research suggest a link to self-efficacy and the development of social and problem-solving skills (Clegg & Butryn, 2012; Fernández-Rio & Suarez, 2016). Self-efficacy has also been researched within the sport of rock climbing. Findings by Llewellyn and Sanchez (2008) suggested climbers with higher self-efficacy took more calculated risks and attempted more difficult climbs than their counterparts with lower self-efficacy. Mastery experience specifically has been found as a key motivational influence in elite winter climbers (Jones et al., 2017). Extreme or non-traditional adventure sports such as rock climbing and parkour involve a similar level of calculated risk also seen in more traditional sports such as diving. The strong relationship between performance and acrobatic sports, such as gymnastics, dance and parkour, suggests a similar positive relationship between self-efficacy and performance will be seen in diving, as diving has many of the same sporting and psychological demands.

2.5. Measuring Self-Efficacy

Self-efficacy beliefs are personal and ever-changing so specific care needs to be taken when deciding how to measure them. The design and implementation of self-efficacy measurement has not been consistent or appropriate across much of the

existing literature in relation to self-efficacy and diving (Feltz, Short & Sullivan, 2008). To improve the ecological validity of future research in relation to diving and self-efficacy consideration needs to be given to the best-suited measure for the research goals, whether the scale should be state specific or more general, hierarchical or non-hierarchical and what type of rating scale would gain the more insightful results. Bandura (2001) highlights the importance of state specific measures to ensure detailed results. Bandura (2006) outlined a set of guidelines for the development of state specific self-efficacy scales using 0 – 100 incremental rating scales, and despite the age of the publication these guidelines are still at the forefront of self-efficacy scale development. However, it is argued that a 0 – 100 continuous rating scale allows for variance between participants and thus a more accurate measurement of participant response (Pajares, Hartley & Valiante, 2001; Usher & Pajares, 2009).

Another area of scale development to consider is the choice between a hierarchical design or a non-hierarchical design. A scale with a hierarchical design includes questions that get increasingly more difficult e.g. rating self-efficacy about ability to perform dives from increasing heights. A non-hierarchical design involves a participant rating their confidence to perform or cope in a series of situations (Feltz, Short & Sullivan, 2008). Care needs to be taken when considering either hierarchical or non-hierarchical designs. Researchers must ensure the questions included in hierarchical scales have a suitable degree of difficulty and should be tested with a pilot sample (Bandura, 2001). Whereas, in non-hierarchical scales the design must allow for the suitability of content using conceptual and contextual analysis, it is also advised that factor analysis is used to ensure homogeneity of the items (Bandura, 2006, Feltz & Chase, 1998).

One method of development for a new self-efficacy scale is the adaption of an existing scale. Adapting an existing scale is often used when attempting to reach a different audience, such as simplifying for younger participants (Qualter et al., 2015) or translating to a different language (Rittery & Lorig, 2014). Another method of scale development utilises initial exploratory qualitative research to generate items to develop a completely new scale (Short, Sullivan & Feltz, 2005). Both approaches can also be combined when developing new self-efficacy scales.

There are many different scales in the area of self-efficacy, but three exemplary scales stand out in relation to diving: the music performance self-efficacy scale (Zelenak 2010); the sources of sports confidence questionnaire (Vealey et al., 1998); and the climbing self-efficacy scale (Llewellyn & Sanchez, 2008). Firstly, The music performance self-efficacy scale successfully measures individual and inherently subjective performance, which is a large part of diving. Secondly, The climbing self-efficacy scale offers an interesting template of measuring self-efficacy in an extreme sports environment. Finally, the sources of sports confidence scale is a reliable, generalizable sport confidence scale that covers all the elements of self-efficacy and more.

2.5.1. Music performance self-efficacy scale. The music performance self-efficacy scale (MPSES) was developed to address the lack of self-perception measures available in the field of music performance. It was highlighted by Zelenak (2010) that self-efficacy within music education is often overlooked despite a large body of research proposing the impact of self-efficacy on music performance (Hendricks, 2009; McPerson & McCormick, 2000; Wehr-Flowers, 2007). Educational researchers had developed and tested self-efficacy measures in many subjects but none had previously been developed specifically for music education. To address this issue the MPSES was created to offer a viable state specific measure. The measure was designed to highlight the self-perceptions of middle school students during their musical education, and as a way of identifying children who may need additional support to enhance their performance skills.

The evidence for using self-efficacy as the theoretical basis of a new scale is very convincing. Many existing scales based on self-efficacy theory have produced viable results that hold up to scrutiny (Aydin & Uzuntiryaki, 2009; Bandura, 1990; Dalgety, Coll & Jones, 2003; Sherer et al., 1982). Zelenak (2010) also highlighted examples of self-efficacy theory being used successfully in music education (Craske & Craig, 1984; McPherson & McCormick, 2007). Bandura (2006) suggested the use of a 0-100 incremental scale rather than a Likert scale to allow for any homogeneity among items. Using an incremental scale provides the opportunity for more variance between items and participants and scope for more detailed results. When developing the MPSES Zelenak (2010) elected to use a 0 – 100 continuous scale which arguably provides the scope for even more variance between items and participants than a 0 – 100

incremental scale (Pajares, Hartley & Valiante, 2001; Usher & Pajares, 2009). The language used was clear, concise and appropriate for a child audience.

The MPSES has been designed to measure each factor influencing self-efficacy separately as well as given an overview of a participants' music related self-efficacy as a whole. Each source of self-efficacy is measured using a separate sub-scale. Separating the measure into separate sub-scales allowed for comparison between the different influences on self-efficacy and the ability to highlight in more detail the impact of different influential stimuli. One weakness of the MPSES could be the transparency of the measure. Each subscale was labelled with the aspect of self-efficacy being measured, which could influence the way participants answer. Also as the items are split into sub-scales a participant may experience questionnaire fatigue on later sub-scales, meaning the results may be skewed towards the earlier subscales. There was also an item designed to test the participant's accuracy, the item was totally irrelevant to the measure and simply asks the participant to write the number 9, and then return to using the 1-100 scale as before. The use of an accuracy item does offer a way of highlighting those not answering accurately but on the other hand could cause unnecessary confusion.

The sample used to test the MPSES was appropriate for its purpose; the scale was designed for use with school age children and the participants were middle school student with ages ranging from 11 to 14 years. The methodology used to develop the MPSES is appropriate for use in other areas of self-efficacy measurement. Many of the areas of interest and items included in the MPSES could easily be adaptable to a diving context. For example item four of the MPSES measuring mastery experience reads "I have positive experiences of performing simple music" (Zelenak, 2010, p41), if the word music was replaced with the word dives the question would be application to a diving context. A state specific measure for diving self-efficacy does not exist, so there is a need for one to be developed to allow the measurement of self-efficacy in diving.

2.5.2. The sources of sport-confidence questionnaire. The sources of sport-confidence questionnaire (SSCQ) used two main theories in its development: Bandura's (1977) self-efficacy theory and Vealey's (1986) conceptualisation of sport-confidence. The argument used to justify the combination of two separate theories derives from the

demand from applied sport psychologists to develop an overarching theory that can be applied in a sports context (Landers, 1983). The use of a combination of theories makes only certain aspects of the SSCQ relevant for the development of a new self-efficacy scale, as some items of the SSCQ were developed using the conceptualisation of sport-confidence as a theoretical basis. The SSCQ contained nine themes, six of which are derived from self-efficacy theory; Mastery, demonstration of ability, physical/mental preparedness, social support, coaches leadership and vicarious experience. The purpose of the SSCQ was to highlight and examine the determinants of self-confidence in sports performance, and to gain insight into how these feelings of self-confidence are developed. The argument presented for the development of the SSCQ is similar to that of similar scales, a suitable scale does not currently exist, which is a strong justification for scale development.

The first stage of the development of the SSCQ was the preliminary development of themes identified from current research, these themes were then evaluated by a small focus group of athletes. The second stage of development involved a small pilot study with 11 athletes from five sports (tennis, swimming, diving, track and field, gymnastics) and three sport psychology professors. The second stage was used to check the item was clear and understandable as well as check for any additional sources of sport-confidence. Finally the third stage of the development involved the qualitative testing of the scale with a representative sample of 137 collegiate athletes from the same five sports (Vealey et al., 1998). The SSCQ uses a 7-point Likert scale, which is against the recommendations of Bandura (2006). The authors provide no justification for the choice of Likert scale over 0 – 100 continuous or interval scales (Vealey et al., 1998).

Overall, the development of the SSCQ provided a strong methodology and a valid and reliable scale. The theoretical approach to the SSCQ was not as reliable, splitting the theoretical backing between two theories provides some confusion about which items and themes are relating to which theory. Also with the inevitable crossover between the theories it is possible that certain items are unintentionally influencing the results of others. For the development of a diving specific scale Bandura's (1997) self-efficacy theory provides a strong theoretical basis without the use of Vealey's (1986) conceptualisation of sport-confidence.

2.4.3. The climbing self-efficacy scale. Like the previous examples of inventories presented, the climbing self-efficacy scale (CSES) was also developed to address the need for a more in depth measure of self-efficacy in a climbing setting. The body of research into high-risk sports has tended to focus on demographic characteristics and personality traits, leaving the more personal aspects of high-risk sport largely under researched (Allman et al., 2009). Researchers have begun to explore the attitudes toward risk and sport motivations in outdoor rock climbers (Llewellyn & Sanchez, 2008) but very little research has addressed the motivations of climbers from an indoor setting. The existing research in climbing self-efficacy used the physical self-efficacy scale (Ryckman et al., 1982), which was not climbing specific. However, taking into account Bandura's (2006) recommendations and the widely accepted belief that state specific measures of self-efficacy would provide more representative results (Krueger & Dickson, 1994; Luszczynska, Scholz & Schwarzer, 2005; Sallis et al., 1988), the development of a state specific climbing scale was justified.

The CSES was developed to measure self-efficacy beliefs among adult rock climbers, specifically those from indoor climbing settings, but item wording was considered to allow the use of the scale in other climbing settings. The scale was aimed at adults, as the language would be too complicated for a younger audience. The methodology used to develop the CSES is in line with many other scale development studies in the area of sport psychology. Llewellyn and Sanchez (2008) used a sequential exploratory study design encompassing interviews with athletes and coaches to develop items, followed by the collection of quantitative data to allow the use of correlation coefficients and factor analysis to establish validity. Semi-structured interviews with climbers, coaches and academics in the field of risk taking and sport psychology were used to develop possible themes and in turn draft items for the measure. The items were then tested to ensure they were all congruent with self-efficacy theory. The accepted 0-100 incremental scale was used, as opposed to a traditional Likert scale, to ensure less homogeneity in the results. One weakness highlighted in the CSES was that the items do not seem to measure all aspects of self-efficacy. The items included in the CSES are focused on mastery experience and physiological factors of self-efficacy and the scale has no items focused on vicarious experience and social persuasion, which would not allow for a truly detailed overview of self-efficacy as a whole. No justification is given for excluding certain sources of self-efficacy. Validity analysis of the CSES

demonstrated a suitably high Cronbach's alpha score suggesting the CSES was appropriate as a measure of self-efficacy in climbers.

The structure used to develop the CSES could be easily transferred to other sports such as diving. The measure itself did not demonstrate the use of all four sources of self-efficacy, which would be a problematic if CSES was to be adapted for use in diving. Scale development using a sequential exploratory methodological design utilising interviews and theoretical backing to developed items followed by qualitative validity analysis seemed to work very well. A sequential exploratory methodological design could easily be used in the development of a diving specific scale, and would also allow for appropriate adaptation for an adolescent participant group.

Overall there are some obvious similarities in the development of self-efficacy scales. The use of exploratory qualitative investigation to establish the pre-existing use and opinions towards self-efficacy within the context appears to be a consistent practise across scale development (Rowan & Wulff, 2007). The evaluation of existing measures alongside qualitative investigation informs the development of themes and items. The use of a 0 – 100 scale is consistent with existing self-efficacy measure (Haladyna & Rodriguez, 2013). The development of a draft scale, followed by validity testing using a context specific participant sample also appears consistent with the scale development methodologies in similar studies (Flanagan & Harrison, 2012). Lessons can be learnt from the adaption of existing scales, however the fact still remains that a diving specific self-efficacy scale does not currently exist and without the development of such a scale reliable and ecologically valid research in the field of diving self-efficacy cannot progress.

2.6. Self-efficacy and The Athletes Psychological Development

The current literature has suggested a link between self-efficacy and performance (Stizmann & Ely, 2011). Researchers in health and education have made the link between self-efficacy and child development (Hokamp, 2006; Meusen-Beekman, Joosten-ten Brinke & Boshuizen, 2015). Research by Côté (1999) highlighted the importance of parental influence on the development of elite athletes', suggesting that certain sources of self-efficacy may have an effect not only on sports performance but also child development.

In a study by Wylleman and Lavallee (2003) four key transitional stages in athletic development were identified. The first stage is usually between the ages of six to seven years, which is the transition from play to organised competitive sport, known as the initiation age. The second stage is the developmental age, between the age of 12 to 13 years in which an athlete transitions to more intensive training and competition. The third transitional state is known as the mastery age, usually between 18 – 19 years when an athlete transitions to the highest level or elite sport. Finally, the fourth stage is referred to as the discontinuation age, in which an athlete transitions out of competitive sport usually between the ages of 28 to 30 years. Research suggests that the unsuccessful negotiation of important transitional phases can potentially increase an athlete's risk of susceptibility to mental illness (Lee & Gramotnev, 2007). As there is no clear evidence to suggest athletes are any better able to cope with mental illness than the general public (Gulliver, Griffiths & Christensen, 2012) something needs to be done to better prepare athletes for important transitional phases.

Both academic research and anecdotal evidence have suggested the potential for negative effects of entering into elite sports such as gymnastics and figure skating at an early age on a child's emotional and psychological development (Ryan, 2013; Tofler et al., 1997). Sports such as gymnastics and figure skating are 'early entry' sports. 'Early entry' sports involve athletes joining the sport and reach a competitive peak at a very young age; often this is achieved through the use of early specialisation. Early specialisation is often the source of heated discussion within a sporting context. The practise of early specialisation was strongly used in eastern European countries and began to be seen in western culture after the migration of athletes and coaches (Hartley, 1988).

Early specialisation is one route to a potential high performance outcome included in the 'Developmental Model of Sports Participation (DMSP)' (Côté et al., 2007). The DMSP proposes three routes to sports participation, two that have the potential to nurture elite performance, early specialisation and early sampling; and one that leads to recreational performance. Early specialisation involves the focus on a single sport and a high amount of deliberate practise (Ericsson, 2006). Deliberate practise refers to activities that involve a high level of repetition and are designed to increase performance, cognitive and psychomotor skills (Duvivier et al. 2011). Early

sampling involves accessing several sports and activities in the sampling years (6 – 12 years old) with a high level of deliberate play. Deliberate play is defined as activities that are focused on enjoyment and intrinsic motivation (Cote, Baker & Abernethy, 2007). Only after the sampling phase will children begin to specialise. In the specialisation years (ages 12 – 14 years) children begin to introduce deliberate practise and reduce involvement in other activities, followed by the investment years (ages 15 – 18 years) in which the child focuses on one sport and training mainly involves deliberate practise.

There are very few arguments in favour of the use of early specialisation in a sporting context, yet the use of early specialisation still seems to be a practise utilised by coaches across sporting disciplines. The arguments in favour of early specialisation in sport revolve mainly around skill acquisition and increasing the likelihood of scholarship opportunities (Hecimovich, 2004). One theory that has been highly criticised is the 10 year rule (Chase & Simon, 1973), in which it is proposed a person needs to train for 10 years to achieve elite performance. Support for this theory has been seen in swimming (Kalinowski, 1995), running (Wallingford, 1975) and tennis (Monsaas, 1985). This theory was then taken further by Ericsson, Krampe and Tesch-Romer (1993) in the theory of deliberate practise by proposing the relationship between time spent practising and proficiency levels, which remains one of the most robust relationships in behavioural science to date. The theory of deliberate practise has by criticised in particular because the theory appears to disregard any effect of 'natural talent' or hereditability of skills (Davids & Baker, 2007). This approach also suggests that the acquisition of skill is purely environmental.

Early specialisation is widely accepted to have negative effects on child development, with research in sport demonstrating negative effects on social skills, attachments and mental health, among others (Barynina et al., 1992; Law, Cote & Ericsson, 2007; Starkes et al., 1996). It has been proposed that early specialisation has a negative effect on social and psychological development due to the limiting of socialisation opportunities and wider experiences (Wiersma, 2000). A review into early sport specialisation by Malina (2010) highlighted a wide variety of negative impacts of early specialisation on child development which included: social isolation, over-dependence on a single figure, burnout, higher risk of manipulation or abuse, physical injury, compromised growth and stunted maturation. In addition, a study by Moesch et

al. (2011) investigated late specialisation in 10 different time and distance measured sports, including cycling, skiing and swimming. The findings suggested that increased anxiety and reduced enjoyment can be associated with early specialisation.

Despite the volume of research illustrating the negative impacts of early specialisation, this approach to training was the accepted method in many sports (Nash, 1987). Early specialisation still appears to be the approach in many sports to date. Several studies in early entry sports highlight that athletes are retiring very young suggesting they must specialise even younger. A study of retired figure skaters by Story and Markula (2017) suggested the average age for retirement from figure skating was 20 years old, and several studies investigating health in elite figure skating have an average participant age of between 8 – 22 years (Heil, 2016; Pantoja et al., 2014). A similar average age of participants can be seen in gymnastics research with an average participant age of between 11 – 19 years (Ribbans, Henman & Bliss, 2016; Silva & Paiva, 2016; Tan et al., 2016), and even in diving research the average participant age falls between 14 – 23 years (Barris, Farrow & Davids, 2012; Narita et al., 2013; Vieria et al., 2017). Several research studies have illustrated that the positive effects of early specialisation on elite success may not be what they seem. One study by Ljach (1997) reported that only 14% of 35,000 Russian athletes involved in early specialisation programmes achieved elite success. Moreover, a study by Gullich and Emrich (2006) reported that approximately 65% of German athletes across all Olympic sports that reached an international final practised early sampling, suggesting early sampling does not appear to reduce athletes ability to achieve success. Furthermore, only 0.3% of athletes out of the 4008 athletes sampled selected at the youngest level achieved a top 10 ranking at senior international level, suggesting early specialisation does not necessarily produce elite success.

One of the problems that arises when a sport requires peak performance to be achieved before full maturation is that early specialisation seems like the only viable option to ensure high levels of practise are achieved. Rhythmic gymnasts who trained intensely in pre-adolescence reported lower levels of enjoyment and health compared with those gymnasts that did not specialise early (Law, Cote & Ericsson, 2008). A similar effect has also been seen in swimming, with high levels of early specialising elite swimmers from a Russian sample reporting psychological fatigue as a main reason for

drop out (Barynina et al., 1992). Contrary to the main body of literature some research studies have suggested a link between early specialisation and achievement of peak performance in 'early entry' sports. This effect has been found in gymnastics (Law, Cote & Ericsson, 2007) and figure skating (Starkes et al., 1996). Despite the efforts of some researchers to change the perceptions surrounding the selection of older athletes in sport such as gymnastics (Kerr et al., 2015) many still feel early specialisation seems unavoidable in certain sports and young athletes are being put under intense pressure to achieve elite success (Gustafsson et al., 2013). Due to these challenges, it is becoming apparent that potential protective and mediating factors to minimise the negative impacts need to be investigated. Self-efficacy has shown to act as a protective factor in response to high levels of psychological stress (Cascio et al., 2014), which suggests a potential use in 'early entry' sports to protect and mediate the negative impacts of early specialisation. The current research highlights a need for further knowledge into the effects of early specialisation on divers development and mental health. The current programme of research has focused on performance enhancement so this theme will not be addressed in the current thesis, but one hopes by identifying the gap in the current literature it will be addressed in due course.

2.7. Approaches to Enhancing Self-Efficacy

Self-efficacy beliefs are important in sport, as evidence suggests these beliefs can increase motivation, enhance drive, and ultimately improve performance (Short & Ross-Stewart, 2009). A study by Nicholls, Polman and Levy (2010) proposed that to improve performance and reduce pre-competition anxiety attention must be given to an athletes levels of self-efficacy. As a result, interventions that effectively enhance efficacy beliefs are important to achieving and maintaining future success. Self-efficacy interventions will often aim to enhance one source of self-efficacy as a main aim and other sources as a secondary aim (Prestwich et al., 2014; Maddux, 1995; Villani et al., 2017). For example, imagery based interventions are aimed at enhancing self-efficacy through vicarious experience but may also have an element of feedback, self-talk or self-evaluation which touch on the source of social persuasion.

2.7.1. Mastery experience. The current literature has already suggested that mastery experiences are seen as the most influential aspect of self-efficacy beliefs and are also the most widely researched (Warner et al., 2014). It has been reported that self-

driven interventions are more effective than externally driven interventions when addressing mastery experience. It has been suggested this is due to athletes attributing their success to themselves in self-driven interventions and to others in externally driven interventions (Feltz & Wiess, 1982). There are several techniques that can be implemented to help address self-efficacy belief formation using mastery experience. One technique used to enhance mastery experience is the use of preparatory skills or skill building (Mainwaring & Krasnow, 2010), known in many sports including diving as 'lead ups'. One diving specific study found that national level divers gained a faster increase in self-efficacy beliefs when practising simple dives than when practising more difficult dives (Slobounov et al., 1997).

Practise or mock competitions can also be used as a method of gaining a level of mastery experience for a novel situation. A study by Hung, Tang and Shiang (2009) implemented the use of a mock competition to increase athlete self-efficacy in Olympic archery and reported successful performance outcomes. An intervention often used with youth or lower level athletes is the modification of equipment to make a challenge easier or less intimidating, for example lowering a basketball net or reducing the length of a swimming distance. A study of novice tennis players by Pellet and Lox (1998) reported that participants who used a tennis racket with a larger head had higher self-efficacy scores than those who used a racket with a smaller head. A more up to date study by Farrow and Reid (2010) used a similar methodological approach to Pellet and Lox (1998). The findings of Farrow and Reid (2010) suggested that modifying the court size and/or ball size increases levels of enjoyment and happiness ratings in novice tennis players.

Goal setting is another very simple intervention often used by coaches and athletes in all levels of sport. The setting and achieving of performance goals helps an athlete to comprehend their own improvement and quantify any behavioural changes. The achievement of a performance goal should result in an increase in self-efficacy beliefs (Bandura, 1997). Goal setting has been successfully used to increase self-efficacy and performance in many sports, including bowling (Boyce & Bingham, 1997) and basketball (Lane & Streeter, 2003). The practise of goal setting is also used quite extensively during training settings to encourage sustained effort and motivation (Elston, 2004; Elston & Ginis, 2004).

The adaption of attributions of performance success or failure is also a successful way of increasing self-efficacy beliefs and addressing the negative influences on developing self-efficacy beliefs. Attributions are the justifications an athlete will use for their success or failure (Weiner, 1985). For example, an athlete may attribute a failure to unsuitable equipment or a biased judge, instead of recognising their own lack of effort or unsatisfactory performance. Athletes should be encouraged to attribute their success to their own ability and not to external sources in an effort to increase self-efficacy beliefs through mastery experience (Maddux & Lewis, 1995). Athletes that attributed their failures in a tennis task to unstable and controllable causes experienced higher levels of self-efficacy to those who attributed their failures to stable and uncontrollable causes (Orbach, Singer & Price, 1999). Interestingly, some researchers have suggested a potential cultural influence on attribution in sport. A cross nationality study by Hua and Tan (2012) investigated the attributions made by athletes completing in the 2008 Olympic Games in Beijing in relation to print and television media. The authors findings suggested that Chinese athletes were more likely to attribute success to external sources such as support and national pride where as American athletes were more likely to attribute their success to internal sources such as personal motivation or personal characteristics. Unsuitable attribution has also been highlighted as a potential cause of slumping or decreased performance in athletes. An investigation of slumping in elite sport by Ball (2003) suggested that a pessimistic attributions style was linked with high frequencies of slumping in sports performance.

Overall mastery experience has a strong link with self-efficacy and the above-mentioned interventions are all closely linked with the development and improvement of self-efficacy beliefs through mastery experience. Despite the research suggesting mastery experience can be achieved from simple tasks (Slobounov et al., 1997), athletes can often become complacent or even bored with simple tasks and require the challenge of more difficult tasks (Csikszentmihalyi, 2014; Jackson, 1995). The literature suggests mastery experience is gained when an athlete feels they have worked hard and achieved success (Chase, Feltz & Lirgg, 2003), and it may not be possible to gain feelings of success from familiar and easy tasks alone. This approach suggests that any interventions that aims to achieve behavioural or performance change through the manipulation of mastery experience beliefs will have to take care to use a task of

appropriate difficulty, so as not to have a negative effect on self-efficacy beliefs with a task that is either too easy or too difficult.

2.7.2. Vicarious experience. The second influence on self-efficacy in Bandura's (1977) model is vicarious experience. The one of the main interventions used to adapt or increase self-efficacy beliefs through vicarious experience is modelling. Modelling refers to the watching and imitation of others behaviour or actions (Westen, Burton & Kowalski, 2006). Research has suggested there are four conditions necessary for effective modelling to take place: attention; retention; production; and motivation (Cummings et al., 2005). There are several different ways to utilise the effects of modelling in a sporting context. Expert-modelling, the imitation of an expert or performer more skilled than ones-self has shown to be effective on performance skill and motivation in youth volleyball players (Barzouka, Sotiropoulous & Kioumourtzoglou, 2015). A similar effect has also been found using real-time expert modelling in rowing (Anderson & Campbell, 2015).

Another type of modelling often used within sport psychology research is feed-forward self-modelling. Described as the practise of showing an athlete videos of their own performance which have been adapted to demonstrate the desired standard (Ste-Marie et al., 2011b). Research has reported that feed-forward self-modelling has a positive effect on both performance and self-efficacy beliefs in gymnastics (Ste-Marie et al., 2011a); and hockey (Feltz, Short & Singleton, 2008). The literature also suggests that it is the adaption of the example the athlete models from that increases the effect on performance and self-efficacy, as self-modelling has shown to be more effective than self-observation (Clark & Ste-Marie, 2007). However, the main theme that emerges from all aspects of modelling research is model similarity. Described as similarity in performance level between the model and the athlete (Short & Ross-Stewart, 2009). Some research demonstrates than an athlete is more likely to improve both performance and self-efficacy beliefs when observing a model similar to themselves (George, Feltz & Chase, 1981; Schunk & Hanson, 1985). However, more recent research has not reported such a strong link. A study within an educational setting by Groenendijk et al. (2013) reported no effect of model similarity on observational learning in adolescents. Another study using model similarity with pre-school children also found no effect on observational learning (Shimpi, Akhtar & Moore, 2013). More

recent studies in sport have also found little support that model similarity has an effect on the efficiency of observational learning (D’Innocenzo et al., 2016; Ghorbani & Bund, 2016). Feltz, Short & Sullivan (2008) further suggested that the type of model used should vary based on the task and situation. For example, if an athlete is aiming to learn a skill through model observation a more proficient model may be required to demonstrate the skill correctly, rather than a peer-model who may not be able to demonstrate the skill to an appropriate standard for learning efficacy to be established. This conflict in the literature suggests further research adopting contemporary research designs may be necessary to establish how important model-similarity is for the development of self-efficacy beliefs through vicarious experience and observational learning.

Another intervention used within the domain of vicarious experience is imagery, which involves an athlete using all of their senses to rehearse a skill or sporting situation in their head (Vealey & Forlenza, 2015). The use of imagery has been reported to have a positive effect on task, ameliorative, and collective efficacy within several sporting contexts including: injury rehabilitation (Wesch et al., 2016); coaching of youth athletes (O et al., 2013); and elite team sports (Shearer et al., 2016). However, often research investigating the effects of imagery on self-efficacy beliefs in sport has previously not used experienced athletes as a participant sample and has often used beginners or non-athletic populations, which could affect the validity of the results (Short & Ross-Stewart, 2009). Studies that have used experienced athletes have found that imagery facilitated a mediating relationship between self-efficacy and sports performance in golf (Beauchamp, Bray & Albinson, 2002), wrestling, rowing, track and field (Mills, Munroe & Hall, 2000) and netball (Callow & Hardy, 2001).

2.7.3. Social persuasion. Social persuasion is the third influence on self-efficacy to feature in Bandura’s (1977) model. The influence of social persuasion covers all external influences that arise from others, such as parents, coaches or audience feedback. Social persuasion is also inclusive of self-persuasion, the feedback gained from the self. Feedback is a very popular intervention for self-efficacy, and can come in many different forms. A study of the effects of feedback on performance of an athletic task by Escarti and Guzman (1999) suggested that self-efficacy could have a mediating effect on the feedback performance relationship. The authors reported that participants who

received positive feedback scored higher on tests of self-efficacy, performance and task choice. Interestingly within the group of participants who received negative feedback, those who were comparatively higher in self-efficacy performed better than those who were lower in self-efficacy. This outcome was supported by Mouratidis, Vansteenkiste and Sideridis (2008) who reported that feedback positively predicted a competence satisfaction in children aged 12 – 17 years on a familiar task. More recent research also seems to support these original findings. A study conducted by Beattie et al. (2016) reported that feedback acted as a moderator of the self-efficacy performance relationship.

Another area of feedback in sport that has been extensively researched is the use of false feedback, which is providing an athlete feedback that is not accurate or truthful (Hu et al., 2016). However, the results of this area of study have a level of ambiguity (Short & Ross-Stewart, 2009). More recent results seem to suggest that false feedback has an affect on performance in a similar way to honest or truthful feedback. People who received false feedback making them believe their pain tolerance was low, scored worse on a go/no-go task than those who received false feedback making them believe their pain tolerance was high (Rigoni et al., 2016). This outcome has also been reported in other aspects of self-efficacy, such as the finding that the inducement of false memories can have a negative effect on memory efficacy in word recollection tasks (Iacullo, Marucci & Mazzoni, 2016). These findings suggest that an intervention using feedback could incorporate elements of both true and false feedback. In general, feedback whether honest or fake has been reported to have a profound effect on sport performance, specifically during the early stages of skill acquisition (Feltz, Short & Sullivan, 2008), and thus should be treated with caution. It is suggested that feedback should be focused on the progress made rather than the use of outcome feedback, and outcome feedback be introduced after a skill is mastered (Kitsantas & Zimmerman, 1998).

Also, the way feedback is delivered can have an effect on the way the messages are received by an individual. In seeking to address this issue, many sports promote the use of a feedback sandwich that consists of a positive comment, a criticism, and ends with a positive comment (Von Bergen, Bressler & Campbell, 2014). The research suggests despite the wide use of the feedback sandwich technique and the practically

universal belief in its effectiveness, there is no empirical evidence to suggest it has any positive effects on performance or self-efficacy (Henley & DiGennaro-Reed, 2015; Parkes, Abercrombie & McCarty, 2013). On the contrary, there have been studies suggesting that the feedback sandwich technique may actually be undermining and have a negative effect on the relationship between the giver of the feedback and the receiver of the feedback (Von Bergen, Bressler & Campbell, 2014). These findings suggest that there is a need for more research to explore the best delivery format for feedback.

The expectation of others provides social stimuli that can have an effect on the self-efficacy levels of athletes (Silva et al., 2014). If the expectations of a parent or coach are unrealistic it could have a detrimental effect on the self-efficacy beliefs of the athlete (Gearity & Murray, 2011). Indeed, some researchers have highlighted that a parent's expectation of a child's competence can have an effect on the child's emotional state (Kaye, Frith & Vosloo, 2015). The literature suggests that parent interaction can often be perceived as a negative influence on performance and self-efficacy in the sporting domain (Gould & Nalapa, 2016; Ross, Mallet & Parkes, 2015). The findings of the current literature suggests that an intervention that adapts the parent and coach expectations to more realistic levels could have a positive effect on an athlete's self-efficacy and potentially their performance. The potential for an intervention to address not only the behaviour and issues of the athlete but of the athlete's support network as well opens up an interesting avenue of enquiry.

Self-talk is also a very well used intervention for the cultivation of self-efficacy through social persuasion. The ambiguity of the current literature in relation to social persuasion extends to literature on self-talk. For example, Weinberg (1985) reported that self-talk has no effect on performance or self-efficacy, however this was contradicted by Blanchfield et al. (2014) who reported that self-talk not only reduced perceived exhaustion rates but also increased overall performance. Inconsistencies appear to run through this area of research, with some studies reporting self-talk to have an effect on self-efficacy but not on performance (Zourbanos et al., 2014); while other studies have reported that self-talk can improve both self-efficacy and performance (Chang et al., 2014). Despite these apparent inconsistencies it appears self-talk has a positive effect on self-efficacy and performance more often than not, thus seems a viable contribution to a self-efficacy targeted intervention. Social persuasion in

general seems to have a profound effect on self-efficacy and performance. It is noteworthy that it appears the debilitating effects of social persuasion far outweigh the enabling effects (Bandura, 1997) so addressing the area of social persuasion is vitally important for any self-efficacy specific intervention.

2.7.4. Physiological states. The fourth and final influence of self-efficacy in Bandura's (1977) model is physiological and affective states. However, more recent research conducted by Feltz, Short and Sullivan (2008) suggested splitting this single category into two further sub categories: emotional states and physiological states. Athletes cognitively assess their physiological arousal and other physiological indicators and make an appraisal judgement that in turn affects their self-efficacy beliefs (Feltz, Short & Sullivan, 2008). There are aspects of sports performance that affect these physiological judgements including: pain, fatigue, arousal, and fitness among others. It is the perception of these physiological indicators that affects the athletes' self-efficacy beliefs, and these perceptions can be unique between individuals despite exposure to identical stimuli.

There is surprisingly little research that focuses on enhancing self-efficacy using physiological sources in diving. The field is lead by Deborah Feltz and her team who have reported that athletes viewed their perceived physiological arousal to be the most salient source of efficacy information in comparison to actual physiological measures such as heart-rate (Feltz & Albrecht, 1986; Feltz & Mugno, 1983). However, in their study Feltz and Mugno (1983) used diving as a novel task and the participants involved were absolute beginners, so it could be argued the findings may not be reflective of more experienced divers. More recent research suggests that higher levels of self-efficacy improves an individual's ability to successfully adapt to a fear situation and reduce physiological arousal (Zlomuzica et al., 2015). The main intervention suggested for self-efficacy gained through physiological influences is re-appraisal. Teaching an athlete to regard their physiological arousal as a tool for improving performance rather than a cause of performance reduction (Jamieson, Mendes & Nock, 2013), for example encouraging an athlete to perceive the feeling of 'butterflies in the tummy' as a sign of physical readiness rather than a sign of fear. The current body of literature appears to support re-appraisal as a technique for improving physiological influences on self-efficacy. It has been demonstrated that arousal reappraisal not only reduced anxiety and

avoidance behaviour but marginally increased performance (Beltzer et al., 2014). Jamieson, Mendes, and Nock (2013) also suggested that the re-appraisal of physiological signals could serve to break the link between negative experience and physiological responses. Gender differences have been noticed in the effectiveness of arousal reappraisal. A study by Kim and Hamann (2012) using a picture recognition task to influence emotional arousal, suggested men showed increased re-appraisal in certain conditions where as women had a more general increase across all conditions. These differing perceptions would impact upon how a reappraisal intervention would be delivered, and received.

Arousal re-appraisal is slightly different from cognitive re-appraisal, which is focused more on adapting emotion by reframing the way a situation is perceived (Gross, 2002). Cognitive reappraisal is the cornerstone of cognitive behavioural therapy (CBT) which aims to change the way a person thinks about a specific situation or problem with the aim of having a positive effect on their behaviour (Beck, 2011). For example, a therapist might seek to challenge a persons thinking about a fear of crowds to allow them to develop their public speaking skills. In Greenberger and Padesky's (1995) CBT techniques book, a thought diary was suggested as one way to challenge negative thoughts and feelings. A client is encouraged to document their negative thoughts then provide evidence for and against the negative thought, and then on reflection document a more balanced thought taking into account the evidence. A similar technique has been applied in tennis case study, in which a thought re-appraisal intervention was used with a youth tennis player with success (Puig & Pummell, 2012). Another intervention study used CBT training based to teach a rugby player to more accurately apprise and react to situations, which had a positive effect on his performance and psychological wellbeing (Edwards & Edwards, 2016).

Finally biofeedback has also been used as a method of psychological intervention in relation to the management of physical stimuli. Biofeedback is the practise of learning to control bodily functions that are usually out of conscious control such as heart rate or breathing rate (Durand & Barlow, 2009). Electrodermal response biofeedback (EDR) has been used to improve personal/emotional control and decision-making in rhythmic gymnasts (Peper & Schmid, 1984) and skiers (Pop-Jordanova & Demerdzieva, 2010), as well as football and basketball (De Witt, 1980). EDR involves placing a specialised unit in

the palm of the hand; the EDR unit reacts to skin conductivity by emitting different pitches of sound (Peper & Schmin, 1984). The monitoring of physiological arousal using tools such as heart rate monitors or EDR equipment allows the athlete to become more aware of their physiological responses and identify situations or stimuli that cause unwanted reactions. Although the current body of research on biofeedback within a sporting environment is still in its infancy, the general consensus is that biofeedback has a positive effect on performance and overall wellbeing (Pusenjak et al., 2015).

2.7.5. Emotional states. The final influence on self-efficacy is emotional states, which refers to the influence and interpretation of emotions. Bandura (1997) recognised that greater emotional intensity had a more intense effect on self-efficacy. According to Maddux (1995) positive emotions are linked with an increase in self-efficacy and negative emotions are linked with a decrease in self-efficacy beliefs. Interventions used to combat negative emotions and promote self-efficacy are: emotional regulation, relaxation and meditation, among others. Emotional regulation is the practise of recognising and regulating emotions. Research findings in studies involving participants diagnosed with PTSD (post traumatic stress disorder) suggest that successful emotional regulation can reduce intrusive and negative thoughts (Shepherd & Wild, 2014).

Relaxation interventions have also been used within a medical setting to help patients deal with pain, anxiety and stress. The current literature suggests that specific relaxation interventions can be successful in reducing perceived pain and increasing self-efficacy in patients recovering from surgery (Lim, Yobas & Chen, 2014). Also, in the field of exercise psychology a study conducted by Kim et al. (2012) investigated the effect of guided relaxation on self-efficacy in older adults. The authors suggested that guided relaxation in conjunction with imagery can improve self-efficacy and improved performance on a simple mobility test. Similarly, meditation has been shown to have a positive effect on self-efficacy. A study by Perez-Blasco, Viguer and Rodrigo (2013) reported that a mindfulness-based meditation intervention reduced stress, anxiety and psychological distress whilst improving mindfulness and self-compassion in pregnant women. Also, research conducted by Goldstein (2014) reported that transcendental meditation improved self-efficacy and quality of life in Ugandan mothers. In recent years several studies have began to investigate meditation within the sporting domain. A study conducted by Baltzell et al. (2014) using mindfulness meditation in football

reported initial reluctance from participants but after engaging in the intervention participants reported greater understanding of their emotions. Similar effects have been seen in tennis (Stankovic & Baltzell, 2015). The positive effects of relaxation and meditation could be transferable across different areas of life, this effect has been acknowledged by many sports that have chosen to incorporate elements of meditation and yoga into their training (Toland, 2014).

2.8. Overview of Diving

Springboard and highboard diving is a highly competitive, cognitively complex sport (Schack, 2004), involving aerial acrobatic skills performed from boards up to a height of 10 metres to exact precision followed by a splash-less entry into water (O'Brien, 2003). Five different board heights are used in competitive springboard and highboard diving, one-metre, three-metre, five-metre, seven and a half-metre and ten-metre. The related sport of cliff diving uses platforms of 20 metres and 26 metres, however the current programme of research has focused on the Olympic sport of springboard and highboard diving. The one-metre and three-metre boards are 4.8-metre long aluminium, cantilevered linear-flex springboards with an adjustable fulcrum to allow for more or less flex (Knox, 1958). The diving tower is a rigid concrete or metal structure that contains the five-metre, seven and a half-metre and ten-metre platforms. The platforms are a minimum of six metres long and between one and two metres wide and covered with non-slip matting. Diving is performed from the boards or platforms into a swimming pool with a depth of 3.5metres to 6metres depending on the height of the boards available (Miller, 2000).

Similar to many acrobatic sports, divers are expected to reach their competitive peak at a young age. The average age in Britain for elite male divers is 22 years and for elite female divers is it 20 years old (British Diving, 2016). However, children as young as 13 years old can be competing at international elite level and national competitive diving starts at the age of 9 years. Due to these demographics in the sport, children training to be divers can be put under a lot of pressure and stress at a very young age. Diving is a sport open to all ages; however often in competition, divers usually compete against others of the same age and level. There are seven age categories for junior diving: Group F (7 years and under), group E (8 – 9 years), group D (10 – 11 years), group C (12 – 13 years), group B (14 – 16 years), group A (17 – 18 years) and open (any age). A

divers age is categorised as their age on the 31st of December of the year of competition, meaning divers born late in the year could be nearly 12 months younger than some of their competitors. Groups F and E complete only at regional level, in lower level novice and beginner events. British diving currently offers four nationally competitive levels: skills, age groups, junior elite and senior elite. Skills is the first level in which a diver can compete nationally, the competitions involve performing a series of ten simple elements of dives, such as jumps and entry drills, as well as two complete dives. Skills level is open to dives aged between 8 years and 16 years of age (group D, C and B). When a diver reaches the appropriate level they will progress to the next level of competition, which is age groups (ASA East Region, 2016). Age groups is open to divers from 9 years to 18 years (group D, C, B and A), and involves performing a list of between five and eight more complicated dives from up to 5 different heights (Swim England, 2017). The next level for divers is junior elite which is open to divers from 11 years to 18 years (group C, B and A) and involves performing a list of between 7 and 10 even more complex dives from the same 5 height options (British Diving, 2016b). When a diver moves on from junior competitions they progress onto the senior circuit and compete in open events, in which divers are only categorised by height of board and not age. Senior level diving is performed from the 3-metre and 10-metre boards and involves performing some of the most complex dives in the world (6 dives for women and 7 dives for men) (British Swimming, 2017).

The current coaching model put in place in 2007 by British Diving is based on the premise of long-term athlete development. The long-term athlete development model (LTAD) was designed as a way of planning athletes training on a more long-term timescale as opposed to focusing on immediate or short term goals (Balyi & Hamilton, 2004). LTAD aims to balance training, competition, and to reduce the focus on results and replace this competitive outlook with a focus on optimal development processes (Balyi & Way, 1995). LTAD models are used within many sporting governing bodies, in sports such as badminton (Badminton England, 2006) and gymnastics (British Gymnastics, 2006).



Figure 2: British Diving long term athlete development model (British Diving, 2005)

The LTAD model used by British Diving (see fig 2) seems to focus on the idea of early diversification, yet athletes are expected to specialise to diving around the age of 11 years, which by the developmental model of sports participation (Côté, Baker & Abernethy, 2007) is still a little earlier than expected. As previously mentioned in the section of this review relating to athlete development, the developmental model of sports participation does not encourage single sport involvement until the investment years, after 15 years of age (Côté & Vierimaa, 2014). The research relating to the developmental model of sports participation highlights many concerns about the affects of an early specifying training programme on an athlete’s mental health and well-being, yet does not seem to offer suitable or satisfactory solutions to the problems identified other than delaying specialisation.

The concerns highlighted by British Diving in relation to the advocacy of an earlier than recommended specialisation phase do not seem to offer suitable strategies to protect youth divers. The literature provided by British Diving (2005) cites four concerns about a the use of an LTAD programme on developing divers: a reduction in attention span and an increase in impulsivity in younger athletes, as well as the potential effects of puberty on diving performance and low self-esteem in adolescent years. However, the provided literature offer little advice or strategies to combat the highlighted issues, only providing generalised advice about avoiding sensitive subjects

such as body shape and depersonalised feedback positing that it will reduce effects of training on divers self-esteem. The lack of support and guidance provided to coaches about addressing self-esteem and low motivation in divers provides a possible explanation for the lack of knowledge and support for mental health issues in diving found by Coyle, Gorczynski and Gibson (2017). This research is further supported by the fact that to date British Diving has not signed the Mental Health Charter for Sport and Recreation, launched in 2015 to promote awareness and mental health provision within sport (Sport and Recreation, 2017).

In contrary to the sparse information about mental health and athlete well-being provided in the UK diving programme, the United States of America appear more invested in diving psychology than other countries and have a very in depth programme in place to support and nurture divers psycho-social development. To begin with coaches and divers are presented with a detailed framework of potential impacts to their psychological development and performance along with realistic expectations based on chronological age (Malina & Gabriel, 2007). Providing a framework of expectations seems an ingenious way of ensuring athletes, coaches and parents are all working towards a common goal, potentially alleviating conflict and stress within the athletes support structure. US diving also encourages their coaches to promote social development and a positive social experience (Cummings, Standage & Malina, 2007), while making them aware they act as a role model and should be aware of the potential impacts of their conduct and behaviour (Danish & Petitpas, 2007; Weiss, 2007). Interestingly, the US diving programme also actively discourages inflictive punishment, which is described as the presentation of unpleasant stimuli such as insisting an in-compliant athlete partake in a punishment of extra sit ups. Instead of the use of inflictive punishment, US diving encourages the use of omission punishment, the removal of a pleasant stimuli, for example if an athlete refuses to do core exercises they are not allowed to attend the next training session (Huber, 2007). The US Diving programme also details numerous psychological interventions that can be used in diving and gives detailed instructions for their delivery. Such interventions include: goal setting, mock competitions, modelling, task modification, preparatory skills, imagery, self-talk, relaxation, meditation and biofeedback, among others. There is a particularly detailed section within the US Diving coaches' manual on the use of relaxation, meditation and biofeedback within a diving context (Parker & Neyer, 2007). This

extensive body of research made available to coaches and divers may explain the apparent performance advantage seen in in the FINA world rankings (FINA, 2017b), and suggests the development of knowledge and psychological programmes within UK diving may help British divers to be more competitive on an international stage.

In contrast, Diving Australia the governing body for Australian diving provides limited resources to their coaches in relation to the effect of performance on divers psychology, mental health and wellbeing (Diving Australia, 2012). The Diving Australia FTEM pathway (Foundation, Talent, Elite and Mastery Pathway) follows a similar framework to the British Diving LTAD scheme. Divers begin in the foundation phase between the recommended ages of 5 – 10 years, in which the focus is on fun and fundamental diving and gymnastics skills. Following the foundation stage divers move up to the talent phase, aimed at ages 10 – 18 years, with a focus on developing basic diving skills and moving towards more complex skills. The elite stage is aimed at aged 14 years and above, and the focus moves towards international competitions and winning medals. Finally the mastery phase is aimed at divers aged 16 years and above with a key focus on sustained success at international level (Diving Australia, 2016). In both the FTEM pathway documentation and the national coaching policy there is limited mention of psychological effects or advice to address any psychological issues (Diving Australia, 2012; 2016). The lack of recognition of the psychological effect of diving or policies to assist divers and coaches with addressing psychological issues seems a consistent theme across diving governing bodies. In the section of the athlete manual labelled health and wellbeing provided by Diving Plongeon Canada, the Canadian governing body for diving, there is no mention of psychological health or support (Diving Plongeon Canada, 2017). In addition, Diving New Zealand has no mention of psychological health or diver wellbeing in their 2013 – 2017 strategic plan (Diving New Zealand, 2013).

Arguably the most successful diving nation in the world to date is China (FINA, 2017b), however due to the tight restrictions in relation to publication and media in China (Xu, 2014) it is very difficult to gain an understanding of their approach to athlete development and sports psychology. From what little information is available about the Chinese approach to sports development it is apparent it is a very structured and strict regime, in which elite athletes are employed by the state and are not permitted full control of their human-capital (Hu & Henry, 2017). If a sporting regime can allow a

situation in which athletes are not permitted sole control of their own lives, can there really be much concern for their psychological wellbeing? Yet, without access to the training programmes and coaching information used within the Zhuanye and Juguo Tizhi systems in China, the wider world may never know what gives China its competitive advantage. It seems that before anything can be done to address the potential psychological pressures and issues surrounding diving performance many in the diving community may need to open their eyes to the worrying lack of communication and psychological support for divers (Coyle, Gorczynski & Gibson, 2017). Enhancing and updating the policies towards psychological health and wellbeing within the diving community may allow diving programmes to take step closer to increasing performance output.

2.9. Existing Research in Diving

Diving is often described as a sport that requires as much mental strength and skill as physical, Dr Jeff Huber made this point very eloquently, “mental challenges are the most formidable obstacles divers confront” (Huber, 2016, p223). Huber is the former head diving coach at Indiana University, and one of the leading experts of the psychology of diving. He proposed a ‘5 pillar’ approach to psychological interventions in diving, the five pillars are: self-talk; mental imagery; energy management; cognitive restructuring; and self-monitoring (Huber, 2016). Greg Louganis is another leading figure in the sport of diving who has voiced opinions on the mental aspects of the sport. Louganis is a diver from the USA who won gold medals in the 1984 and 1988 Olympic Games on both three metre and 10 metre, and has been described throughout his diving career and long after as the best diver in history. Louganis mentioned, in the 2014 documentary *Back on Board*, that the mental aspects of the sport are the most challenging (Sweeny & Furjanic, 2014), highlighting that a diver is not only competing against the other athletes but against their own demons as well. British diver Tom Daley has also been very open about the effects of mental block and psychological pressures on his diving performance. Back in 2014 Daley was reported to be suffering from Lost Move Syndrome as a result of an unfortunate flashbulb putting him off whilst performing a back two and a half summersaults with two and a half twists during London 2012 (Hart, 2014). Lost Move Syndrome is often described as a psychological condition in which athletes are unable to perform skills or tasks that they once found easy or automatic (Day et al, 2006). Daley described how he is haunted by the memory

of the flash blub at the London 2012 Olympics whenever he attempts to perform the dive (Hart, 2014). Daley later removed the dive from his list due to the inability to address these negative memories and replaced it with a more difficult dive, forward three and a half summersaults with one twist, known as the firework dive (Bloom, 2015). Sarah Barrow, another GB Olympic diver, has wrote about struggling throughout her diving career with the gremlins in her head that would tell her she wasn't good enough and her body not allowing her to attempt dives (Barrow, 2017). Other well known divers such as Australia's 2008 Olympic gold medal winner Matt Mitcham and the USA's 2012 Olympic gold medal winner David Boudia have mentioned the debilitating effects of psychological barriers, mental block and emotions on their training and competition performance in their autobiographies (Boudia & Ellsworth, 2016; Mitcham & Writer, 2012).

Mental health and psychological struggles are a consistent theme across many divers biographical and autobiographical works of current and retired divers. Greg Louganis, in his autobiography 'Breaking the Surface', mention attempting suicide on three separate occasions due to severe depression and violent mood swings relating to his diving (Louganis & Marcus, 2006). Another high profile diver Matthew Mitcham also mentioned self-harm due to the pressures of diving and his coach,

'My first big cutting episode was when I was aged 14, at a junior national diving competition. I was furious with Hui over something critical that he said to me, and I lashed out at him by lashing out at myself ... took out the blade and swung, literally swung, at my arms with it, making cross hatch cuts up and down my arm.'" (Mitcham & Writer, 2012, p67).

David Boudia, also mentioned struggles with substance abuse and suicidal thoughts and how he felt it was the support of his diving coach Adam Soldati that helped him through his difficult times by introducing him to religion. "Adam and Kimiko began sharing a message that changed my life – a message that gave me hope, freedom and purpose" (Boudia & Ellsworth, 2016, p86). The apparent consistencies between the problems and pressures suffered by different divers from different generations, different countries and different genders suggest there may be a common cause. These athletes have many things in common but the most obvious is diving. Is it possible the consistent theme of psychological struggles in divers autobiographies is a coincidence or could there possibly be a causal relationship between the pressure of diving and psychological struggles.

Due to the technical and physical attributes of diving a large amount of the research conducted in the field is associated to technique advancement (Barris, Davids & Farrow, 2013; Barris, Farrow & Davids, 2014); or injury prevention (Badman & Rechline, 2004; Le Viet, Lantieri & Loy, 1993; Mountjoy et al., 2015; Zillmer, 2003). Despite the fact that research into the psychology of diving has historically been less popular there is still an emerging body of research covering different aspects of diving psychology.

In the 1970's researchers in diving psychology began investigating the reduction of stress and overload, reporting that decreasing the number of cues, such as amount of feedback points, could reduce the likelihood of overload and mastering the fundamental basic skills would assist in combating the negative influences of stress and improve performance consistency (Walker, Nideffer & Boomer, 1977). A recent controversial study by Stoker et al. (2016) explored how diving coaches elicit highly pressurised training environments to enhance performance by using task stressors, pressure stressors and environmental stressors. Research of this calibre needs to be treated with a level of caution. Due to the age and developmental level of many divers creating high stress training environments may have a positive effect on their performance in the short term, but the potential devastating effects on diving performance and psychological wellbeing in the future would need further research before promoting such practises. Another study in the 1986 also highlighted coaching as an influence on divers performance. A study by Carter (1986) investigated the prevention of diving injuries and posited that skilled, experienced coaching and a supportive social system could assist in the prevention of injury in diving and subsequent performance. Existing research in the field of diving has highlighted a potential physiological difference between a baulked dive, which is the practise of abandoning an attempt at a dive and a completed dive (Barris, Farrow & Davids, 2013; 2014; Headick et al., 2015), but has failed to address the underlying cause of baulking a dive.

Researchers have also begun to take steps to investigate the difference between higher-level and lower-level divers, and what potential personal and environmental influences can cause one diver to become better than another. A study by Highlen and Bennett (1983) comparing high and low level divers found that divers who achieved

qualifying positions in competition had higher self-confidence and concentration than non-qualifiers, yet qualifiers reported higher levels of pre-competition anxiety than their lower-level counterparts. Self-confidence and self-efficacy have often been studied together due to the close links between the two constructs (Schunk, 1991; Schunk & DiBenedetto, 2016), consequently findings suggesting a positive effect of self-confidence on performance could be the initial signs of a potential affect of self-efficacy too. Leading to a seminal study within the field of self-efficacy in diving by Feltz and Mugno (1983). The authors investigated the sources of self-efficacy in novice divers; divers reported perceiving physiological and affective states to have the biggest influence on their performance of a new dive, these findings highlighted for the first time the importance and influence of physiological and affective states within diving. Self-efficacy in diving was addressed again from the perspective of mastery experience; findings suggested that mastery experience levels increase faster when divers practised simple dives rather than more complex dives (Slobounov et al., 1997).

The body of literature in diving started to illustrate potential differences between levels of anxiety, self-efficacy and confidence between different levels of divers despite similar environmental stimuli (Feltz & Mugno, 1983; Highlen & Bennett, 1983; Slobounov et al., 1997). Could the variation in ability in fact be the way divers were processing and perceiving their environment? In a study by Bell, Finch and Whitaker (2010) investigating divers preparation for competition, the results suggested that the length of pre-performance routine increased in relation to the difficulty of the dive. The length of the pre-performance routine also had a subsequent positive affect on performance. The researchers found that higher-level divers had significantly longer pre-performance routines than lower-level divers (Bell, Finch & Whitaker, 2010). These findings further supported the premise that it could be the way in which a diver prepares and perceives their environment that makes the difference in their ability levels. A review of diving literature by McGregor and Abramhamson (2000) suggested that research should aim to address the effects of stress and negative arousal experienced by divers when attempting to improve performance and acquire new skills. Also, a recent study by Coyle, Gorczyński and Gibson (2017) highlighted that mental health in divers was a cause for concern, with knowledge of mental health and symptoms limited, as well as little to no support systems in place for those divers requiring mental health support or advice. Moreover, further studies highlight the

worrying effects of abuse (Marks, Mountjoy & Marcus, 2011) and disordered eating (Melin et al., 2014) on mental health within aquatic sports. Reviews such as these along with the limited support and advice provided by governing bodies (British Diving, 2005; Diving Australia, 2012; 2016; Diving Plongeon Canada, 2017; Diving New Zealand, 2013) highlights a worrying trend in the approach towards divers health and wellbeing. There is a necessity for further action to address the needs of divers and the potential for applied interventions to protect and enhance divers performance, health and wellbeing.

After the turn of the millennium research within the diving domain began to take a more pragmatic, problem solving approach and more studies began to address the practical and applied use of psychological skills in diving to increase performance and reduce stress. Imagery is a psychological skill used extensively within diving. The current literature suggests that divers use imagery as an active process, to activate themselves both psychologically and physically (Post et al., 2014). Other studies in the area of imagery use in diving have posited a difference between the use of imagery among different diving levels, suggesting expert divers have a much more automatic approach to imagery due to their higher level of diving knowledge and experience (Reed, 2002). Another intervention-based study addressed the use of self-modelling in diving, but found no effect of self-modelling on self-efficacy levels or performance in divers (Rymal, 2007). Findings from these intervention based studies begin to highlight that some sources of self-efficacy and approaches to self-efficacy enhancement may be more appropriate to diving than others. A single applied case study used mindfulness-acceptance-commitment protocol with an adolescent springboard diver to improve performance (Schwanhausser, 2009) but little attempt has been made to replicate this study on a larger scale, thus making generalisation to the larger diving community very difficult. The aforementioned intervention-based studies in diving seem to have reviewed the research for their particular intervention but made little effort to properly address the needs of the diving community. Before any applied performance enhancing interventions can be developed for divers more knowledge into the diving community and needs of competitive divers is necessary. Research by Feltz & Mugno (1983) suggested that divers were most affected by physiological and affective states, which makes the initial steps to suggesting divers might be influenced by the sources of self-efficacy in a different way to other sports.

2.10. Summary

Clear links have been made between self-efficacy and sports performance (Wright, O'Halloran & Stukas, 2016; Wurtele, 1986). Self-efficacy in acrobatic sports such as gymnastics and dance has been associated with effects on performance (De Pero et al., 2013; Gomez-Paloma, Rio & D'anna, 2014; Young-Mee & Jin-Young, 2016). Findings in diving also support the use of self-efficacy as a performance enhancing tool (Feltz & Mugno, 1983; Post et al., 2014; Slobounov et al., 1997). Yet the current body of diving literature appears to be unorganised in addressing the use of self-efficacy in diving. Before suitable diving specific self-efficacy interventions can be designed more knowledge into the attitudes, uses and understanding of self-efficacy within the diving community is necessary. Also findings from existing research allude to the premise that the sources of self-efficacy might have a different importance hierarchy in diving (Feltz & Mugno, 1983; Reed, 2002; Rymal, 2007), suggesting further investigation into self-efficacy and its sources in a diving context is necessary to establish a valid and reliable basis for future interventions. In addition, it is suggested through the literature that investigation into situational self-efficacy requires a situational specific self-efficacy scale (Bandura, 2006; Zelenak, 2010). Yet despite existing research covering self-efficacy within a diving context, a diving specific self-efficacy scale is yet to be created. Without a diving specific scale the robustness of diving specific research using general scales is in question, however the development of a diving specific scale would take steps towards addressing this issue of ecological validity.

The current body of literature also highlights the potential negative psychological effects of intense and high level training on athletes; this appears to be a particular problem in 'early entry' sports such as diving. The potential issues associated with early intense training on youth athletes could be addressed from the point of applied psychological interventions. Psychological interventions are used within diving to date, yet their use is neither well informed or targeted in many diving communities. USA diving appears to have a much more thought out and targeted approach than British Diving, which may be contributing to their long established international success. Cultural and gender differences are very prevalent in sports such as diving (Deaner & Smith, 2013; Harley, 1988) and need to be taken into account then considering the appropriate use of psychology within sport. Another aspect of intervention design that provided an interesting avenue for discussion was the potential for designing an

intervention to encompass the athletes' whole support system. Promoting behavioural change not only in the athlete but also in the significant influences on the athlete such as parents or coaches could present the potential for a more successful intervention. More specific areas of the intervention based research that presented with noticeable gaps was model similarity and delivery of feedback, further investigation into the impacts and correct practise for these aspects of self-efficacy intervention could also allow for more targeted and successful interventions to be developed.

The current literature review highlighted many gaps in the diving and self-efficacy research available to date. As the current thesis has taken a performance approach certain avenues of investigation such as the effects of diving on mental health and wellbeing are beyond the scope of the current programme of research, but present an interesting opportunity for future research. The current programme of research aims to first provide context to the existing diving research by using qualitative investigation to highlight the opinions and themes surrounding self-efficacy in different diving communities. Once a base of context has been established a suitable method of measurement will be designed to ensure a suitable, state specific scale of self-efficacy designed exclusively for diving, which will enhance the ecological validity of the current studies and future diving research. Finally, the current programme of research then aims to apply the newfound knowledge surrounding diving self-efficacy to the diving community, by designing and implementing performance enhancing protocols with competitive divers.

Before any research can commence a researcher must first establish a suitable research methodology, which informs and underpins the style and interpretation of the research process (Sapsford & Jupp, 2006). A research methodology also informs the overall design, data collection and analysis of a given study (Collis & Hussey, 2003). Therefore, it appears evident that the philosophical underpinnings and research strategies used within a research study can affect the interpretation of any potential research outcomes. Often the philosophical approaches and research strategies used within academic research are referred to as a research paradigm. There are three main research paradigm used in social sciences research: positivism, constructivism and pragmatism. A positivist approach is based on the premise that knowledge can only be gained from measurable and verifiable facts and uses primarily quantitative statistical research strategies (Phillips, 1987). In contrast, a constructivist approach is based on the premise that knowledge can be gained through analysis of the human experience and often utilises qualitative research strategies (Allen, 1994). Finally, a pragmatic approach posits that thought is a tool for the collection and understanding of knowledge and is often associated with a problem solving research approach in which the best research strategies are the ones most suitable to the problem under consideration (James, 1975).

A research paradigm is defined as a collection of common beliefs and arguments shared by a research community about how knowledge should be understood and how problems should be addressed (Kuhn, 1996). A research paradigm encompasses a researchers practical experience, relationship to knowledge and real-world research applications (Saunders et al., 2012). A specific research paradigm is characterised by its ontology, epistemology and methodology (Guba, 1990). Ontology is the study of being (Crotty, 1998), and is concerned with the study of what exists and what it is to be or to exist. Each research paradigm is based on a foundation of ontological assumptions, in social sciences ontological assumptions are based on questions about the natures of social reality (Blaikie, 2007).

Epistemology is the study of the understanding of knowledge and belief (Bunge, 2012). Often research studies within sport and exercise psychology overlook or omit a

clear explanation of the epistemological approach. In an analysis of sport psychology research studies published between 2000 and 2009, Culver, Gilbert and Sparkes (2012) found that only 13.7% of the 1,324 studies considered detailed their epistemological stance. Some researchers posit that the epistemology and philosophy of research is often overlooked due to the way research methods is taught within psychology. Darlaston-Jones (2007) suggests the focus on the practicalities of research methods and techniques within university level teaching results in the neglect of the important theoretical elements of research. The understanding and consideration of epistemology within research design is vital, without a broader understanding of the researchers concepts of knowledge and interpretation it is often difficult to fully understand any potential research findings (Gringeri, Barausch & Cambron, 2013).

Methodology refers to the approach, strategies and techniques utilised in the pursuit of knowledge (Mertens, 2014). There are three main methodological approaches used within social sciences research: quantitative, qualitative and mixed methods. Quantitative research focuses on the use of statistics and empirical facts, whereas qualitative research focuses on the exploration and interpretation of the human experience (Creswell, 2013). Mixed methods research uses a combination of qualitative and quantitative research strategies within the design (Tashakkori & Teddlie, 1998). All three methodological approaches are used extensively throughout sport and exercise research.

The theoretical framework utilised to underpin a programme of research dictates the collection, analysis and interpretation of the data collected. The research onion (Saunders, Lewis & Thornhill, 2012) illustrates the variety of theoretical and methodological options available to a researcher and the journey from philosophy to research procedures (see figure 3).

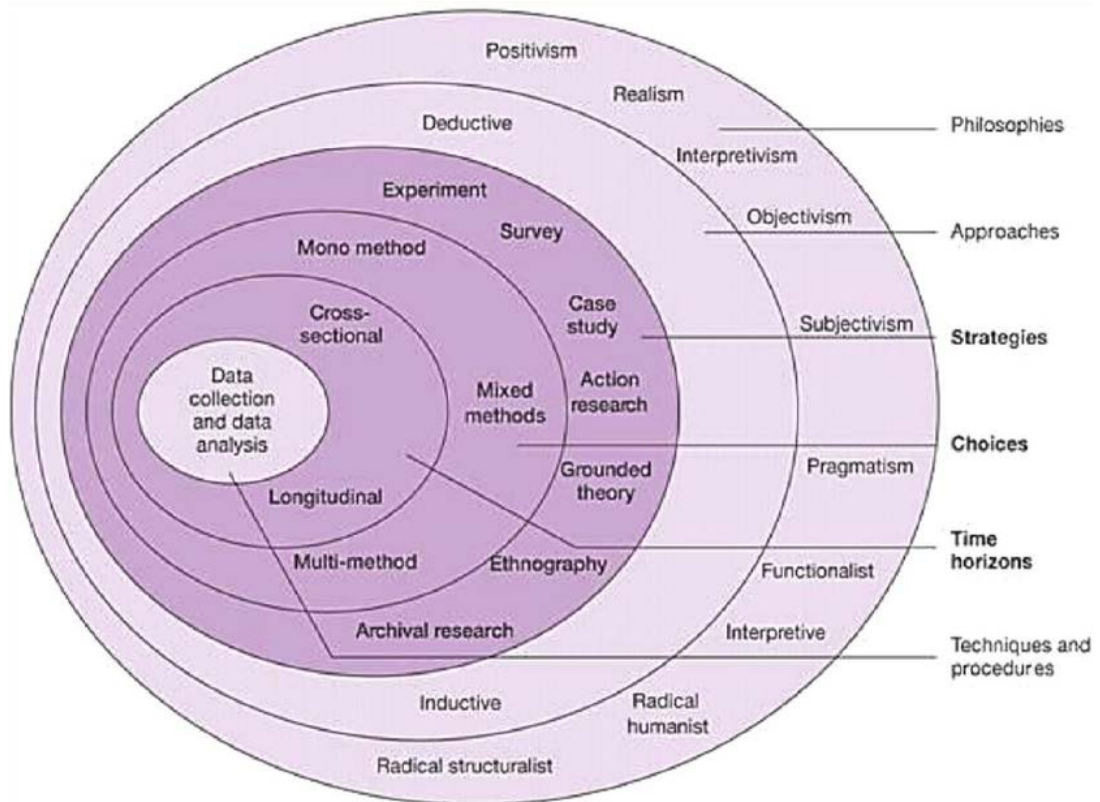


Figure 3: The Research Onion (Saunders, Lewis & Thornhill, 2012)

The current thesis is based on a pragmatic methodological approach and the current chapter outlines the journey from pragmatic philosophy to specific research procedures.

3.1. Philosophy

The research paradigm and philosophical underpinnings of a piece of research can provide a holistic view of how the knowledge presented should be viewed and how we can relate this knowledge to our lives.

Originally, in social sciences research traditionally fits into one of two main research paradigms: positivist or constructivist (Tashakkori & Teddlie, 1998). Positivist research was ordinarily quantitative by design, focusing on observable and objectively measurable facts and typically using research methods such as surveys, questionnaires and statistical analysis (Schrag, 1992). Alternatively, constructivist research primarily takes a qualitative direction focusing on value-laden enquiry and the nature of social reality, utilising research methods such as interview and participant observation and analysing data through thematic and phonological interpretation (Allen, 1994). The often-heated debate between the uses of qualitative or quantitative methodologies has

contributed to a false dichotomy. The notion that research strategies and techniques can be categorised so simply is absurd. When attempting to assert if certain research strategies are purely qualitative or purely quantitative the nuances and interplay between the two methodologies in techniques such as case studies or cohort studies can be lost (Walsh, 2011). The focus on a dichotomous relationship between qualitative and quantitative methodologies has furthered unhelpful assumptions about the rigor and reliability of certain research methodologies, often overlooking the abundant opportunities possible when combining the two methodologies (Lawrence, 1993). Due to the conflict between the two research paradigms and associated theorists, which was deemed “the Paradigm Wars” by Tashakkori and Teddlie (1998), a new paradigm emerged, Pragmatism.

Pragmatism was popularised by William James and John Dewey in the early 1900’s, it was put forward as an attempt to address contemporary problems experienced by real people rather than a way of understanding abstract concepts such as truth or God (James, 1907). Works by John Dewey also focused on the redirection of philosophy away from abstract concepts and to re-focus on the human experience. Dewey suggested that experience was based on two questions: What are the sources of our beliefs? And what are the meanings of our actions? and the focus of research inquiry as only one facet of human experience (Dewey, 1922/2008). Following a Deweyan approach to inquiry, Morgan (2014) posits there are not clearly defined boundaries between academic research and day to day life, suggesting that both require the same process of inquiry, beliefs and actions to acquire knowledge, only stating that academic research is a more careful and considered approach to knowledge acquisition. A pragmatic approach is based on the premise that reality is in a constant state of change and is re-negotiated and interpreted based on each situation (Creswell & Plano-Clark, 2007). A pragmatic paradigm posits the best way to understand knowledge is the best method for solving the problem (Giacobbi, Poczwardowski & Hager, 2005). A level of debate is present in relation to the epistemological and methodological stance of pragmatism. The simplistic view of pragmatism as a paradigm that simply focuses on what approach will best solve a problem has caused the nuances of the paradigm to be overlooked. Pragmatism is not only a practical problem solving approach but also a way of gaining a holistic view of experience through the use of different methodologies to acquire knowledge that other research paradigms lack. On the contrary, one major

consequence of taking a pragmatic research approach is the lack of reliance on metaphysical versions of the philosophy of knowledge (Teddlie & Tashakkori, 2011). Pragmatism has the capacity to rely more on the effects of the human experience on the interplay of beliefs and actions as appose to the more structured ontology, epistemology and methodology approach of other paradigms. It is not to say that a pragmatic approach precludes the traditional approach of metaphysical philosophy, but merely suggests that it is based on a set of beliefs and actions appropriate to a particular set of circumstances (Morgan, 2014). A pragmatic research focus has been used in sport psychology in an attempt to bridge the gap between academic research and applied practise (Giacobbi, Poczwardowski & Hager, 2005)

The current the programme of research is focused on the understanding and exploration of self-efficacy within diving, along with the measurement and application of self-efficacy to improve performance. A pragmatic research paradigm was best suited to the research studies included in the current programme of research for several reasons. Firstly, both positivism and constructivism are quite restrictive in their understanding and exploration of knowledge, where as pragmatism offers a lot more flexibility and applicability to more applied practise. The real-world focus of pragmatism over the theoretical focus of positivism and constructivism also offered more suitable philosophical underpinnings for the current studies. The programme of research presented within the current thesis aimed to gain an understanding of self-efficacy from both an individual perspective and a boarder community perspective. Due to the necessity to establish such different aims and participant groups within the several studies included in the current programme of research more flexible research strategies and methodologies was necessary to fully explore the subject matter. Finally, a pragmatic approach as been used in many similar studies within sport psychology and self-efficacy (Llewellyn & Sanchez, 2008; Samson, 2012) suggesting the suitability of a pragmatic paradigm for the current programme of research.

3.2. Mixed Methods Approach

Pragmatism is often associated with the use of a mixed methods methodology. A pragmatic paradigm does not promote the exclusive use of qualitative or quantitative methodologies but simply suggests the best methodology is the one that solves the problem, which in certain circumstances could be a combination of the two (Morgan,

Matthews & Kirby, 2011). Using a single research methodology has its strengths and weaknesses. Qualitative methodologies focus on exploration and gaining more detailed in-depth knowledge and are often applied to new problems or in situations where little existing knowledge is available. Whereas quantitative methodologies focus on the testing of hypotheses based on existing knowledge and often use statistics to identify causal relationships (Flick, 2015). Qualitative research is sometimes criticised due to the limited ability for generalisation where as quantitative research can be criticised for a lack of underlying knowledge of the individual and how the situation affected their experience (Bernard & Bernard, 2012). Mixed method research can be used as a way of accounting for the weaknesses of a single methodological approach. Supporters of a mixed methods approach propose seven major advantages: completeness, strengthening potential weaknesses, triangulation, informing future sampling, enhancing generalisation, hypothesis development and instrument development (Doyle, Brady & Byrne, 2009; Greene, Caracelli & Graham, 1989; Hagger & Chatsisarantis, 2011; Hesse-Beber, 2010). Mixed methods research is also able to simultaneously investigate both exploratory and confirmatory research questions, unlike a single design approach (Tashakkori & Teddlie, 2003).

Yet not all researchers are supportive of a mixed methods approach, qualitative researchers especially suggest a mixed methods approach can dilute pure qualitative enquiry and the two methodologies can never be truly compatible (Shank, 2006). Research by Creswell et al. (2011) advises researchers using a mixed methods approach should be wary of three main controversies: legitimacy, philosophical underpinnings and the pragmatics of conducting mixed methods research. Legitimacy is concerned with whether mixed methods research is truly needed to address the research problem. Philosophical underpinnings questions whether or not it is possible for all methods in the study should be informed by compatible theoretical approaches. The pragmatics of conducting a mixed methods study highlights concerns about the ability to ensure the researchers have the appropriate skills and knowledge for a wide array of research strategies that can potentially be used within mixed methods research. So the true challenge of a mixed methods research study is the careful and considered use of both methodologies in a complimentary way to gain detailed insight that also has the potential for generalisation across the population.

One research approach associated closely with mixed methods research is triangulation. Triangulation is the use of multiple data sources to provide a rich, well-rounded understanding of a phenomenon (Jick, 1979). There are five types of triangulation: methodological triangulation, data triangulation, investigator triangulation, analysis triangulation and theoretical triangulation, (Denzin, 1978; Hussein, 2015; Kimchi, Polivka, & Stevenson, 1991; Patton, 1999). Methodological triangulation is the use of multiple methods of data collection to highlight complementary or conflicting aspects of the same phenomenon. Data triangulation is the use a variety of data sources in different environments, such as different times, places or participant samples. Investigator triangulation is the use of multiple researchers to analyse data sets, this is often helpful in qualitative studies to highlight any bias or blind spots in a researchers interpretation. Analysis triangulation is the use of multiple methods of data analysis within the same data set. Finally, theoretical triangulation is the use of multiple theoretical perspectives to design a study and interpret any findings. Triangulation is utilised for two main reasons: validation of data (Campbell & Fiske, 1959; Flick, Kardoff & Steinske, 2004) and completeness of data (Jick, 1979; Tobin & Begley, 2004).

There are three main templates for mixed methods research: sequential explanatory design, sequential exploratory design and concurrent triangulation design (Creswell, Fetters & Ivankova, 2004; Rauscher & Greenfield, 2009; Tashakkori & Creswell, 2007). The sequential explanatory design involves first using quantitative investigation, which leads into qualitative research and culminates in a combined analysis of the first two stages. The sequential exploratory design is the opposite, beginning with qualitative investigation, which leads into qualitative research and culminates in a combined analysis of the first two stages. The third basic template is concurrent triangulation, which involves the simultaneous collection and analysis of both qualitative and quantitative data.

Despite the benefit of gaining insight from both qualitative and quantitative sources, mixed methods research appears considerably less popular than using a single methodology. A study by Gilbert and Trudel (2004) into the methodological choices of coaching science research found only 14.4% of studies published between 1970 and 2001 used a mixed methods approach. The number of studies using a mixed methods

approach is slightly higher in sport psychology research, 38% of the 485 studies published from 1990 to 1999 (Culver, Gilbert & Trudel, 2003) and 31.1% of the 1324 studies published between 2000 and 2009 (Culver, Gilbert & Sparkes, 2012). Using a mixed methods approach is advocated by many researchers in sport and exercise, researchers posit that the use of a mixed methods design allows a study to give a holistic understanding of an athlete and their circumstances (Cameron, Castañer & Anguera, 2014; Rauscher & Greenfield, 2009; Moran, Matthews & Kirby, 2011).

An exemplary study in sport and exercise psychology is Llewellyn et al. (2008), who used a sequential exploratory design to investigate the relationship between self-efficacy and risk taking in rock climbers. The authors initially used qualitative methods to conduct semi-structured interviews with climbers, instructors and academics to gain an understanding of self-efficacy and risk taking. Following the qualitative exploration, a climbing specific self-efficacy scale was developed and validated using quantitative research strategies. Finally the knowledge gained from the qualitative phase and the newly validated scale was used to conduct a study using an experimental design to investigate the relationship between self-efficacy and risk taking behaviours. The current programme of research had very similar research goals to that of Llewellyn et al. (2008) suggesting a sequential exploratory design would be suitable.

The current programme of research elected to take a sequential exploratory mixed methods approach, beginning with qualitative exploration, followed by quantitative scale development, culminating in a combination of the two methodologies for the development and testing of a performance enhancing self-efficacy intervention in diving. A mixed methods design was desirable due to the inherent strengths in relation to hypothesis development, instrument development and the complementary and confirmatory ability of using two different methodologies to enhance and corroborate the findings of the other. The current programme of research has been designed based on a pragmatic research paradigm using a mixed methods design as it was deemed the most appropriate research paradigm based on the applied nature of the research problem. In addition, previous research within the realms of niche sport and self-efficacy has primarily used a sequential exploratory mixed methods design further supporting its suitability.

3.3. Research Strategies

The current programme of research utilised several different research strategies from both the qualitative and quantitative research domains. Due to the mixed methods approach of the current programme of research some research studies included used a single data collection technique in isolation and others combined several data collection techniques to ensure the highest quality and quantity of appropriate information. Below is a detailed rationale for the use of each research strategy; further procedural information can be found in each individual study's associated chapter.

3.3.1. Interviews. An interview is an interchange of ideas and opinions between two or more people for the purposes of collecting knowledge for research data (Kvale, 1996). Interviews are inter-subjective, rather than purely subjective or purely objective, allowing participants to discuss their interpretation of experiences and situations (Laing, 1967). There are three main interview formats for the purposes of social sciences research: structured, semi-structured and narrative/unstructured (Stuckey, 2013). A structured interview is often described as a verbally delivered questionnaire, and involves a strict, rigid set of questions with little scope for prompts or additional depth (Gill et al., 2008). Structured interviews can be delivered quickly with limited training for the interviewer, and due to the rigid format are more comparable between participants than other less structured forms of interview (Altinay, Paraskevas & Jang, 2015). Semi-structured interviews often involve a predetermined set of open-ended questions from which a dialogue between the researcher and the participant can stem (DiCicco-Bloom & Crabtree, 2006). As a semi-structured interview encourages a dialogue between the participant and the researcher it is possible to gain a deep and personal understanding of a subject from the perspective of the participant. However, semi-structured interviews can take anywhere between 30 minutes to several hours to complete and are open to subjective interpretation (Jamshed, 2014). A narrative or unstructured interview is more like a purposeful conversation between an interviewer and a participant, often used in health research to allow participants to talk about any influences of their illness on their life (Stuckley, 2013). Narrative or unstructured interviews are time consuming, and often difficult to interpret due to the wide array of themes and discussion points (Gill et al., 2008).

The current body of literature highlights several benefits to using interviews within a research setting. Semi-structured and narrative interviews are flexible and allow for the collection of multi-sensory data through both verbal and non-verbal communication. In addition, the flexibility of certain types of interviews also allows for researchers to re-introduce and revisit topics of questions that have not been sufficiently covered (Cohen, Manion & Morrison, 2007). There are however several constraints when using interviews as a method of data collection. Most interviews are time consuming and due to the detailed nature are often difficult to document without the use of recording equipment, which can make participants uncomfortable (Adams & Cox, 2008). Moreover, the subjectivity of analysis methods used in association with interviews are open to interpretation and researcher bias, also due to the one on one nature of interviews anonymity can often be difficult to maintain during the interview and in subsequent written reports (Cohen, Manion & Morrison, 2007).

Interviews were used in study two of the current programme of research. Semi-structured interviews were performed via Skype™ with a sample of retired divers. The use of the online video conferencing software Skype™ was necessary due to the commitments and geographical locations of the participants who volunteered for the study. The current body of literature posits that synchronous web conferencing such as video chatting software offers a reasonable, cost-effective alternative to face-to-face interviewing without risking a reduction in the validity of the interview (Deakin & Wakefield, 2014; Hanna, 2012). A semi-structured interview approach was used to allow for the collection of in-depth data from participants and allowed for less inhibited responses as the communication was only between the researcher and the participant. Finally, the ability to revisit areas or concepts that required more clarification was useful to gain insight and validate the reliability of the findings of study one.

3.3.2. Focus groups. A focus group is a group of people put together for the purpose of discussing personal opinions and experiences of a specific topic being researched (Gibbs, 1997). Some researchers argue the positive aspects of using focus groups rather than more traditional interviews are purely extrinsic processing benefits, such as the speed and cost effectiveness of interviewing several people at once, or the safeguarding aspects of having a group of people rather than one on one situations (Stokes & Bergin, 2007). However, others argue that the benefits of using focus groups

fit into two main categories: the replication of social forces (Krueger & Casey, 2000) and the possibility for group interaction (Albrecht et al., 1993). Research by Zikmund (1997) proposed the 10 S's that detail the benefits of focus groups:

1. Synergy – the ability to gain a wider range of information from group than is possible from one person.
2. Snowballing – the ability to facilitate a chain of ideas and opinions with the use of group discussion.
3. Serendipity – the concept that great ideas can come out of nowhere.
4. Security – the concept that individuals more likely to talk openly when surrounded by like-minded people.
5. Stimulation – the ability to allow people views to be brought out and developed by group discussion.
6. Spontaneity – As participants are not required to answer every question individuals will answer when they have a valid and succinct point to portray.
7. Specialisation – A specialised researcher is able to interview more people in the same amount of time.
8. Structure – Allows for the re-introduction of topics if the researcher feels they have not been sufficiently covered.
9. Speed – Allowing the questioning of multiple participants in the same time frame of interviewing one participant.
10. Scrutiny – Able to facilitate observation by other researchers or parents, for validity or safeguarding.

Despite the large number of positive aspects of using focus groups as a data collection method, the current literature also highlights several disadvantages of the use of focus groups. Firstly, due to the group discussion aspects of focus groups if the group is too large group discussion may splinter off into smaller discussions that are difficult to accurately document. Secondly, stronger personalities may over take the discussion, potentially restricting the involvement of more shy individuals resulting in bias findings. Thirdly, individuals may not be entirely truthful in their response due to the influence of others in the room (Adams & Cox, 2008). Many studies in sport utilise as focus group approach, specifically with younger participants (Kanters, Bocarro & Casper, 2008; Keegan et al., 2010) as focus groups allow for a safe, secure forum for discussion.

Focus groups were used in study one of the current programme of research. Study one used semi-structured questioning in two focus groups. Each focus group included six participants from varying ability levels and ages to ensure suitable representation of the wider diving community. Focus groups were used to facilitate discussion with youth participants in a safe, less intimidating environment. The ability of focus groups to encourage and facilitate discussion between participants of different levels and backgrounds was seen as a stronger rationale for their use. The facilitative qualities of a focus group outweighed the potential negative effects of stronger personalities steering the discussion. Using participants of different ages, abilities and backgrounds ensured a wide range of discussions, but it was inevitable that some participants would feel shy or inhibited. To combat this the semi-structured nature of the focus group ensured there were questions and discussion prompts suitable for every experience level of diver involved in the study. In addition, focus groups allowed for observation from parents of participants for safeguarding purposes. As the majority of the participants were under the age of 18 years and potential discussions centred around psychological difficulties and past failures, which had the potential to cause a level of distress, one to one interviews presented too much of a safeguarding issue.

3.3.3. Direct Observation. Direct observation has been described as watching or recording behaviours or observable facts, for example how a person interacts with a shop assistant or how many products are on a supermarket shelf (Cohen, Manion & Morrison, 2007). Research by Morrison (1993) suggested observations can gather data from four fundamental settings: the physical setting such as an environment, the human setting for example physical characteristics, the interactional setting such as verbal or non-verbal communication, and programme setting for example resources available or pedagogic styles. Traditional observation is non-interventionist, meaning the researcher has no effect on subject that is being observed (Adler & Adler, 1994).

The current body of methodology literature highlights many benefits to the use of observation as a data collection method. Observation is a good way of collecting information from young participants who may not be able to articulate their opinions or experiences verbally (Odom & Ogawa, 1992). Also, observation can provide a close to true picture of an experience or situation, and provide less opportunity for bias, modesty or embarrassment that may effect the way people respond to questions

(Robson, 2002). The use of observation within behavioural research can allow for the collection of nuances in everyday behaviour the participant may be unaware of and would have gone unreported in self-report measures (Cooper & Schindler, 2001). Moreover, observation can allow for the collection of behavioural data in contrived or sensitive settings (Bailey, 1994). Furthermore, observation can be a fast, non-intrusive method of collecting factual data such as time of participant arrival or duration of training session (Cohen, Manion & Morrison, 2007).

Despite the array of research promoting the positive aspects of observation there are also some constraints associated with the use of observation within a research domain. Firstly, an observation is only an accurate portrayal of a specific moment in time and may not truly reflect the reality of the specific environment (Cohen, Manion & Morrison, 2007). Secondly, the use of observation requires suitable access to the environment that can sometimes be difficult to gain. Finally, due to the nature of observation there is very little structure or control of the setting, which could result in very little useable data (Bailey, 1994).

Observations were used in studies one, two and six of the current programme of research. During studies one and two participants were observed whilst involved in either focus groups or interviews. Whereas, in study six direct observation was a method of collecting data in relation to behavioural change before and after a psychological intervention. The ability to collect factual data without intrusive questions made observation a suitable data collection tool, specifically within the studies using adolescent participants. Moreover, observation was used to gain an insight into the non-verbal communication and behaviour within the focus group setting to attempt to account for the potential effect of stronger personalities biasing verbal responses. In addition, observation offered an impartial measure of behaviour in relation to the effects of the diving psychological intervention. Due to the subjective nature of diving gaining an empirical measure of performance is difficult, direct observation by a training researcher with experience in diving judging offered a suitable alternative.

3.3.4. Vicarious Observation. The process of collecting the observations of the participant or people close to the participant in an attempt to gain their specific view of

a complex situation or social episode in a naturalistic way is known as vicarious or participant observation (Cohen, Manion & Morrison, 2007).

The use of vicarious observation avoids the need for detailed questioning of participants and can be used to gain several different insights (Kitwood, 1977), for example, parent or teacher's attitudes towards pupils school performance. Vicarious observation can simply be a parent recording how a child behaved, or can be more structured by giving a set of prompting questions when asking someone to account an experience verbally or in writing (Cohen, Manion & Morrison, 2007). In contrast, vicarious observation is less organised and structured than other data collection alternative (Kitwood, 1977) such as researcher observation as the quality of the data is hinged on the understanding of the observer. There is also limited ability to re-visit areas of less detail when using vicarious observation (Cohen, Manion & Morrison, 2007).

Vicarious observation was used in study six of the current programme of research, which involved the use of a diving specific self-efficacy intervention in an attempt to improve performance in adolescent divers. Parents and coaches of the participants involved in study six were asked to record their observations of the participant's behaviour in diving sessions before and after the intervention. The ability to gain a naturalistic insight into the attitudes and opinions of people close to the participant made vicarious observation a suitable data collection tool. In addition, vicarious observation by parents and coaches could be used to corroborate or question self-report measures used with the participants. The use of vicarious experience in conjunction with self-report measures and direct observation was a way of attempting to ensure data saturation through triangulation.

3.3.5. Questionnaires. Often the term questionnaire refers to a set of written questions completed by a participant for the purposes of research (Bee & Murdoch-Eaton, 2016). There are many different types of questionnaires, such as: structured questionnaires, unstructured questionnaires, open-ended questionnaires, closed-ended questionnaires, mixed questionnaires and pictorial questionnaires to name just a few (Gillam, 2008). The current programme of research utilised the use of open-ended questionnaires, closed-ended questionnaires and mixed questionnaires. Questionnaires are a quick, efficient and cost effective way of reaching a potentially large subject group

(Patten, 2016). In addition, questionnaires produce structured quantitative numerical datasets that are often more simple to analyse than long winded qualitative alternative. (Wilson & McLean, 1994). Numerical data allows for ease when comparing between or within groups (Oppenheim, 1992). Moreover, questionnaires are often used as a more suitable and tactful way of collecting more sensitive information that participants may not feel comfortable sharing within an interview or focus group setting (Patten, 2016).

In contrast, questionnaires are time consuming and difficult to develop, requiring detailed development to ensure usable and appropriate data are collected (Wilson & McLean, 1994). Questionnaires often receive quite low response rates and only provide a snapshot rather than a detailed picture of a certain phenomenon (Patten, 2016). However, the main limitations with questionnaires as a method of data collection is the potential for participants to not be entirely truthful (Sudman & Bradburn, 1982) and answer questions in what is deemed a socially desirable way (Patten, 2016). Research has shown people tend to agree more often than disagree with dichotomous questions (Youngman, 1984). In addition, people are more likely to disagree with positive statements than to agree with negative statements (Weems, Onwuegbuzie & Lustig, 2003), illustrating potential for respondent bias.

The current programme of research used questionnaires to collect data in studies three, four, five and six. Study three was the development and validation of a closed-ended continuous scale questionnaire, the DIVE-SE scale. Study four and five used the newly developed DIVE-SE scale with different samples of the diving community. Study six, used the DIVE-SE scale along with an open-ended questionnaire aimed at recording the feelings and opinions of the participant in relation to the success of the intervention. In addition, the intervention itself involved the use of a mixed questionnaire as part of the training session diary used to teach divers to question their physiological and emotional reactions towards new and more complex dives. Questionnaires were used as they were cost effective, time saving, easy to administer and transferable to both large international samples and small local samples. Additional care was taken in study three to develop a suitably valid and reliable measure for self-efficacy within a diving community for use within the current programme of research as previously no such measure existed.

3.3.6. Case Study. A case study is described as the study of a specific instance or situation to gain insight to a more general principle, and allow researchers to gain a better understanding of how ideas or abstract principles work in a real world setting (Nisbet & Watt, 1984). Research by Hitchcock and Hughes (1995) proposed seven main aspects of a case study:

1. Providing detailed insight into the relevant case
2. Presenting a chronological narrative
3. Ability to blend description with analysis
4. Focuses on the individual
5. Highlights specific events relevant to the case
6. Allows researcher involvement in the case
7. Portrays detail and richness of the case experience in the report

There are three main types of case study investigation: descriptive, explorative and explanatory (Yin, 2013). Exploratory case studies are designed to explore a phenomenon within the body of research; for example, a case study concerned with how an athlete goes about learning a new skills would employ an explorative design. Descriptive case studies are used to describe a set of naturally occurring phenomena; for example, describing the current approaches used by coaches in relation to coaching disabled athletes. An explanatory case study aims to examine the data collected both on the surface and on an underlying level to explain phenomena; for example, why an athlete would use a specific pre-performance routine (Noor, 2008). These types of case studies can be used to explore a single case, such as a single athlete or situation, or in conjunction with other cases as a multiple case research design. Multiple cases allow for a further richness to the information collected and for the comparison of situations across several individuals (Baker, 2011). Six methods of data collection are often used within a case study design:

1. Documents – e.g. letters or agendas
2. Archival records - e.g. competition results
3. Interviews – e.g. reflective interviews about a competition experience
4. Direct observation – e.g. observing an athlete interact with their coach

5. Participant/vicarious observation – e.g. the observations of a parent about their child's behaviour in training
6. Physical artefacts – e.g. trophies or awards

To allow coherence and consistency between all the methods of data collection, Yin (2013) proposes three principles of data collection within a case study research design. Firstly, triangulation, which is the use of several different data collection methods to ensure correct and consistent findings. Secondly, the case study database, which is a record of all data and collection methods in relation to a single case, similar to an audit trail for qualitative research. Finally, to maintain a chain of evidence, which requires the research design and data collection methods to evolve and adapt by using the case study database. A holistic approach to case study analysis involves using only one method of data collection to study the global nature of a phenomenon. Whereas, an embedded approach includes multiple methods of data collection to study both a main phenomenon as well as smaller alternative phenomena (Yin, 2013). When using an embedded approach it allows for within case analysis, between case analysis and cross-case analysis using the same participant (Baxter & Jack, 2008). However, care must be taken to ensure too much focus isn't given to the individual subunit levels resulting in a neglect of the global issue the case study was originally designed to address (Yin, 2013).

Once the data have been collected Yin (2013) proposes two general analytic strategies to approach analysis: theoretical propositions and case description. Theoretical propositions rely on theory guiding the analysis and helps researchers to focus on relevant findings and ignore extraneous data. Using a theoretical propositions approach provides a foundation for the study and is referred back to at each point of the data analysis and interpretation (Baxter & Jack 2008). Whereas, using a case description approach relies on basing analysis on a descriptive framework in relation to the phenomenon in question.

Finally three analytic techniques are proposed for single and multiple case study analysis: pattern matching, explanation building and time-series analysis (Yin, 2013). Pattern matching is a process that involves comparing empirically based patterns with expected outcomes, rival outcomes or simple patterns. For example, an

expected outcome pattern would be finding predicted results and that no other alternative patterns are present. Whereas, a rival explanation pattern would be finding no predicted results, and simpler patterns would be finding that pattern matching is possible with only a small number of variables excluding extraneous detail. Explanation building is a process of analysis that involves building a detail explanation of a case and identifying potential causal links. The process of explanation building follows a series of steps (Yin, 2013):

1. Developing an initial theoretical statement
2. Compare with initial findings of a case
3. Revise the theoretical statement to better fit the case
4. Compare with the detailed findings of the case
5. Revise theoretical statement further
6. Compare with findings of additional cases.

Finally time-series analysis involved asking questions about the relationships between variables and their changes over time. The results of the case are compared with a predetermined sequence of events identified using existing theory prior to the commencement of the study.

Many researchers see case study research as a method of gaining detailed insight into a specific reality, moving research concepts into a more applied constructs and creating research that is accessible by a wide variety of audiences (Adelman et al., 1980). Due to the detailed approach of case studies it is possible to capture unique insights and behaviours that may get lost in big data studies (Nisbet & Watt, 1984). In addition, group experimental designs can often come out as non-significant but be masking positive results in individual cases (Barker et al., 2011). Case studies are often using within behavioural, health and sport domains to investigate concepts such as injury and burnout because of their specific nature. Also, the recruitment of large numbers of participants with the same symptoms for an experimental design would be unfeasible (Kinugasa, Cerin & Hooper, 2004). Moreover, case studies offer a way of demonstrating the potential effects of interventions on an individual level in a real world setting (Barker et al., 2011). As with any methodology there are always drawbacks and case study designs are no exception. Single and multiple case study designs offer limited

transferability within the specific community of study (Baxter & Jack, 2008) and are not generalisable to a wider community (Nisbet & Watt, 1984). Also, often case study methodology is applied in-correctly resulting in poor quality studies (Barker et al., 2011), that are harder to cross check and prone to observer bias (Nisbet & Watt, 1984).

A multiple explanatory case study research design was used in study six of the current programme of research. Study six involved using case studies as a method of measuring the effectiveness of a diving specific self-efficacy intervention with adolescent divers. Due to the difficulty with recruiting large numbers of participants that presented with similar symptoms and environmental factors a multiple case study approach offered a viable alternative to a more traditional group experimental design. Additionally, the potential for a detailed insight into the effects of arousal re-appraisal on divers self-efficacy and performance within a real world setting was interesting from a research perspective, but also as a way of raising awareness and publicity for the phenomenon in an accessible way to a wider diving audience a case study design was perfect. Moreover, the inherent nature of a case study design offers potential for several methods of data collection and analysis to be used in a complementary fashion allowing for in depth insight into the individual experience of each participant.

3.4. Data Analysis Approaches

The current programme of research utilised many different data analysis techniques from both the quantitative and qualitative realms. As the current programme of research employed a mixed methods design some studies elected to use both a detailed qualitative analysis and quantitative statistics. This section details all the data analysis techniques utilised within the programme of research and why they were appropriate for their respective studies. Further procedural information and greater detail in relation to analysis can be found in each individual studies respective chapter.

3.4.1. MANOVA. Multivariate analysis of variance (MANOVA) tests for the difference between two or more the vectors of means between two or more groups and is adapted from the univariate analysis of variance (ANOVA). A MANOVA is used when a data set contains two or more dependant variables (Warne, 2010). An assumed causal relationship can be inferred from MANOVA analysis (Mertler & Reinhart, 2016). The use of a single MANOVA instead of multiple ANOVA analyses reduces the rate of potential

type 1 errors (Bender & Lange, 2001). In contrast, a MANOVA requires the data to meet many assumptions that puts restrictions on the data sets suitable for MANOVA analysis (Finch, 2005).

The current programme of research used a MANOVA analysis in studies three and four due to the data set presenting with multiple dependant and independent variables that satisfied the assumptions for MANOVA analysis. The aim of the data analysis in study three was to determine the suitability of the DIVE-SE scale in terms of discriminant validity when comparing self-efficacy levels in divers of differing ability levels. Study four aimed to determine the hierarchy of the sources of self-efficacy within a diving sample. In both studies a MANOVA analysis was suitable as it allowed for the investigation of differences between one or more groups and the inference of causal relationships.

3.4.2. Principal component analysis. Many different fields of study utilise principal component analysis to reduce and extract relevant information from complex data sets, and is arguably one of the most widely used statistical approaches for dimensionality reduction (Candès, Ma & Wright, 2011). Principal component analysis is a non-parametric method of identifying key factors within a large quantitative data set (Jolliffe, 2002). Principal component analysis requires no special assumptions on the data like other forms of factor analysis meaning it can be applied to any data set, and can deal with large data sets made up of both objects or variables (Halko et al., 2011). On the other hand, the non-linear structure of principal component analysis makes it difficult to gain a definitive model or establish the meaning of latent variables, as well as being vulnerable to corrupted data or outliers that can potentially jeopardise the reliability of any results (Candès, Ma & Wright, 2011).

Principal component analysis was in study three of the current programme of research during the development and validity testing of the DIVE-SE scale. Principal component analysis was used because it is suitable for any data set and was able to handle the large variance between participants and variables (Halko et al., 2011) where other forms of factor analysis may have struggled. In addition, principal component analysis has been used by similar scale development studies in sport (McAuley & Gill; 1983), health (Lorig et al., 1989; Sallis et al., 1988; Wright et al., 2014) and education

(Yildirim & Tezci, 2016). The use of the same data analysis techniques as other similar studies allows for direct comparison between studies and stronger ecological validity.

3.4.3. Cronbach's alpha co-efficient. The cronbach's alpha co-efficient, otherwise known as tau-equivalent reliability (Cho, 2016) is used as a way of estimating the internal reliability of a psychometric measure or scale (Cronbach, 1951). Internal reliability is a measure of how each item of a scale correlates with other items and the total score (Steiner & Norman, 2003). Cronbach's alpha is expressed as a number between 0 and 1. For a scale to gain a suitable level of internal consistency the Cronbach's alpha co-efficient score should be between .75 and .90. A score above .90 suggests that some items may be measuring the same variable and thus unnecessary, and a score below .75 suggests poor question design or heterogeneousness (Tavakol & Dennick, 2011). The Cronbach's alpha coefficient is a strong, widely used measure of internal reliability as it has been subject to extensive methodological investigation (Cortina, 1993; Peterson, 1994). One weakness of the Cronbach's alpha co-efficient as a measure of internal consistency is the sensitivity to the number of items, a low Cronbach's alpha score may be due to an insufficient number of items rather than poor design (Tavakol & Dennick, 2011).

The current study used the Cronbach's alpha co-efficient in study three when designing the DIVE-SE scale for the measurement of self-efficacy in springboard and highboard divers. Cronbach's alpha was used because it is a strong, reliable method for establishing the internal reliability of a psychometric scale or measure (Cortina, 1993; Peterson, 1994). The Cronbach's alpha co-efficient has been used extensively in similar scale development studies within sport (Grenwood, Dzewaltowski & French, 1990; Llewellyn et al., 2008; Vealey et al., 1998), music (Zelenak, 2010), education (Yildirim & Tezci, 2016) and health (Dennis & Faux, 1999), further supporting the suitability as a measure of internal consistency within scale development.

3.4.4. Pearson's correlation co-efficient. The Pearson's correlation co-efficient is used to determine linear correlation between two variables. The results of a Pearson's correlation co-efficient are presented as a number between +1 and -1, +1 represents a total positive correlation, 0 represents no correlation and -1 represents a total negative correlation (Sedgwick, 2012). Pearson's correlation co-efficient offers a simple, easy to

understand quantitative measure of bivariate association (Mukaka, 2012) and is often more reliable than other correlation co-efficients (Hauke & Kossowski, 2011). However, Pearson's correlation is vulnerable to sample size, outliers and false results', meaning the lack of significance in the analysis does not always mean a lack of relationships between the variables (Zou, Tuncali & Silverman, 2003).

The current study used Pearson's correlation co-efficient in study three to establish convergent validity of the DIVE-SE scale by comparing scores on the DIVE-SE scale with scores on other more general self-efficacy scales. Pearson's correlation co-efficient has been used extensively in self-efficacy scale development studies to establish convergent validity (Birdee, Sohl & Wallston, 2016; Chesney et al., 2006; Darawad et al., 2016; Glynn & Ruderman, 1986; Kelleher et al., 1997; Lorig et al., 1989). Finally, the simplicity, reliability and accessibility made Pearson's correlation co-efficient a viable form of analysis and easily understandable by the wider diving community who may not have extensive statistical knowledge.

3.4.5. Multiple Linear Regression. A multiple linear regression is a type of analysis used to determine the relationship between one dependant variable and multiple explanatory variables (Freedman, 2009). Regression analysis is often used when a study aims to establish if certain variables will predict an outcome (Zou, Tuncali & Silverman, 2003), for example if time spent exercising and weight can predict health. Multiple linear regression analysis is a very widely used in academic research because it is robust, widely applicable to different data sets and relatively easy to interpret (Mason & Perreault Jr., 1991). It is suggested that multiple linear regression analysis has two major advantages. Firstly, multiple linear regressions analysis allows researchers to determine the potential influence of one or more predictor variables on the dependant or outcome variable. Secondly, the analysis allows for identification of outliers and anomalous patterns within data (Cohen et al., 2013). One limitation of regression analysis is the over-interpretation of the results, regardless of the strength of a relationship between two variables it is not possible to infer causation from regression analysis alone (Zou, Tuncali & Silverman, 2003).

Multiple linear regression analysis was used in study five of the current programme of research to establish is self-efficacy levels could predict competition

performance in adolescent divers. Multiple linear regression analysis was suitable for study five as it is a reliable, easily accessible and robust analysis for exploring predictor variables (Mason & Perreault Jr., 1991). The multiple linear regression analysis allowed study five to determine the potential influence of self-efficacy and each source of self-efficacy on competition performance. Alternative forms of analysis such as a correlation co-efficient or ANOVA would not allow for the depth of information and interpretation possible from a multiple linear regression.

3.4.6. Thematic analysis using open coding. Thematic analysis is often used within a pragmatic paradigm as a method of classifying qualitative research data into patterns or established models (Aronson, 1995). Open coding involves defining and categorising concepts into categories based on similar properties or meanings (Burnard, 1991). Thematic analysis and open coding are often used in conjunction to produce a strong methodological approach for qualitative research in health psychology (Gooden & Winefield, 2007; Tong et al., 1998), organisational psychology (Bowen, Edwards & Cattell, 2012; Dasborough, 2006) and sport psychology (Fuchs & Schomer, 2007; Thomas, 2011; van der Horst et al., 2016). Thematic analysis is a flexible, widely used but often under-acknowledged qualitative approach (Braun & Clarke, 2006). In addition, thematic analysis involves a relatively low level of researcher interpretation reducing the influence of researcher bias (Vaismoradi, Turunen & Bondas, 2013). However, like all research approaches there are certain pitfalls and weaknesses to thematic analysis. The lack of analytical narrative is a common weakness of inexperienced researchers using a thematic approach; the researcher must make analytical and illustrative interpretations using the data rather than just produce a collection of extracts and paraphrases (Braun & Clarke, 2006).

Thematic analysis using open coding was used in studies one and two of the current programme of research to interpret the transcripts of focus groups and interviews with current and retired divers. Thematic analysis was used over more popular qualitative analysis methods such as grounded theory, because the foundations of thematic analysis fit strongly within a pragmatic research approach (Aronson, 1995). Moreover, thematic analysis was appropriate as the current programme of research aimed to use self-efficacy theory as a basis on which to interpret and categorise the qualitative findings.

3.4.7. Visual Analysis. Visual analysis in relation to a single case research study design is the interpretation of visual displays of data such as charts, graphs and diagrams (Lane & Gast, 2014). The current body of literature suggests visual analysis is used more often than statistical analysis within case study research, with statistical analysis being used in less than 10% of single case research studies (Busk & Marasculio, 1992). The most common experimental model of visual analysis used within a single case study research design is the AB model, which compares pre and post intervention testing (Harrington & Velicer, 2015). A researcher or independent judge will draw conclusions about the success of an intervention based on the visual difference between baseline tests and post intervention tests displayed on charts or graphs.

Several studies have highlighted weaknesses in a visual analysis approach. One main weakness is the apparent unreliability of visual analysis between judges; studies have demonstrated that inter-judge agreement can differ from 39% to 61% in some studies (Jones, Wienrott & Vaught, 1978; Ottenbacher, 1990). In contrast, a study by Wampold & Furlong (1981) compared inter-judge agreement in visual analysis across 36 different cases and found only a small amount of change between judgements. Moreover, the supporters of visual analysis posit that statistical analysis in single case research designs is overly complex and unnecessary, proposing that visual analysis has the ability to reveal any intervention effects large enough to be of interest to an applied audience (Brossart et al., 2006).

Visual analysis was used in study six of the current programme of research to analyse the effects of an arousal re-appraisal intervention on three athletes using a multiple case study design. As each athlete was treated as a single case study visual analysis allowed for the comparison of pre and post intervention scores on performance, anxiety and self-efficacy without the unnecessary complications of statistical analysis. In addition, the results of visual analysis present as much easier to understand than complex statistical analysis for the non-academic audience of the study, such as athletes, coaches and diving officials.

3.5. Summary

During this chapter many abstract concepts and methodological decisions have been discussed. When considered in isolation each study stands alone as an individual contribution to diving literature, however this thesis as a whole offers the reader a holistic picture of diving research from several different perspectives. A pragmatic philosophy allows the current programme of research to adapt and evolve through the research journey based on the findings of each individual study. The use of a sequential exploratory mixed methods design also allows for each study to inform the design and implementation of subsequent studies (Rauscher & Greenfield, 2009). As little was previously known about self-efficacy in diving flexibility within the philosophical and epistemological underpinnings was necessary to facilitate detailed exploration of the field. Moreover, using an abductive reasoning approach provides further support for the flexible problem solving philosophy of a pragmatic paradigm. Abductive reasoning uses a logical progression to find a suitable and most likely explanation for a phenomenon (Walton, 2014). The current programme of research takes a cross-sectional view of diving research, mainly due to the time constraints of a full time PhD, the three years available for the research did not allow for reliable longitudinal studies. The full methodological process is illustrated as a 'research onion' inspired by (Saunders, Lewis & Thornhill, 2012) (Figure 4).

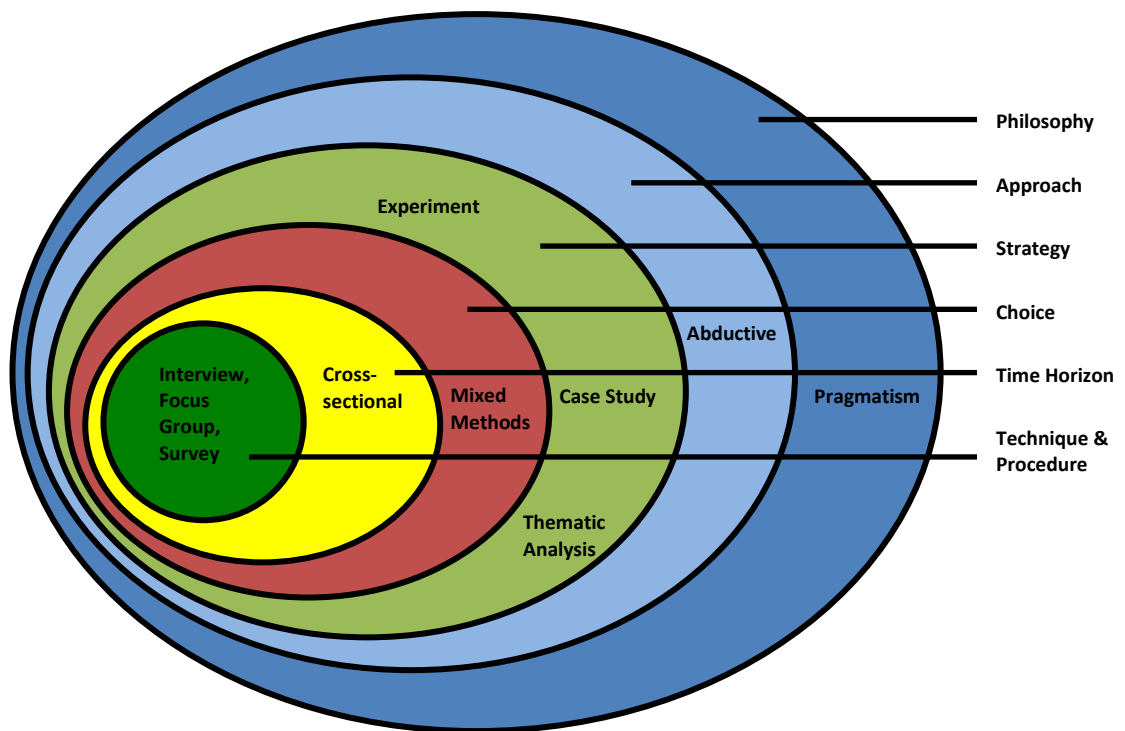


Figure 4: Research Onion for the current programme of research

The methodological approach for the current thesis was informed by existing research in the area of sport, social sciences, education and humanities. The primary influence for the methodological approach was a study by Llewellyn et al. (2008), who used a sequential exploratory design to investigate the relationship between self-efficacy and risk taking in rock climbers. The study by Llewellyn et al. (2008) utilised qualitative methods to gain an initial understanding of the rock climbing community followed by the development of a situational specific self-efficacy scale, which was used in the later studies to measure the relationship between self-efficacy and risk taking. This methodological approach seems very suitable for exploratory research within an under-researched and niche sport. The current programme of research aims to offer a fuller understanding and enhancement of knowledge in the field of diving psychology from several perspectives and the use of a pragmatic approach will allow for a truly flexible and adaptable research methodology.

4.1. Aim

The aim of study one was designed to provide context by explore the use and perceptions of self-efficacy within a diving environment, along with exploring the influence of the five sources of self-efficacy from the perspective of competitive divers. The initial rationale for the study was based upon my own personal experience of being a diver that experienced psychological pressures and mental blocks throughout my diving career. In addition, during my years of coaching diving I have come across many other divers experiencing similar problems. In addition to my own personal experience the psychological struggles of other divers is a well-documented phenomena in the press and literary non-fiction, such as divers autobiographies from divers like Tom Daley, Greg Louganis, Matt Mitcham and David Boudia (Boudia & Ellsworth, 2016; Daley, 2012; Louganis & Marcus, 2006; Mitcham & Writer, 2012). Great British Olympic diver Sarah Barrow has wrote at length about her struggles with negative thoughts and what she describes as gremlins in her head (Barrow, 2017). Greg Louganis, widely regarded as the best diver in history, has described many times when mental struggles and psychological pressures affected his diving performance and well-being (Louganis & Marcus, 2006; Sweeny & Furjanic, 2014).

Existing exploratory studies in marathon running (Samson, 2014) and golf (Valiante & Morris, 2013) aimed to provide a contextual basis for future research by using a qualitative approach to investigate sport specific self-efficacy. In addition, many scale development studies undertook initial qualitative investigation to develop themes and context for a situational specific scale (Llewellyn & Sanchez, 2008; Zelenak, 2010) providing further need for initial qualitative investigation into self-efficacy in diving. Research undertaken in sports such as gymnastics and dance posit that self-efficacy does influence an athlete's perceptions about their abilities and performance within their sport (Chase, Magnar & Drake, 2005; De Pero et al., 2013; Gomez-Paloma, Rio & D'anna, 2014; Young-Mee & Jin-Young, 2016), see chapter three for review. As diving shares many of the same physical, mental and aesthetical demands as gymnastics and

dance it could be proposed that divers may experience some of the same influences on their self-efficacy as seen in the afore mentioned research studies.

The reported experiences of divers in both the press and literary non-fiction suggests that divers have both positive and negative experiences in relation to diving (Boudia & Ellsworth, 2016; Daley, 2012; Louganis & Marcus, 2006; Mitcham & Writer, 2012; Russell, 2009), yet without further exploration using a more rigorous methodology there is little that can be learnt from literary non-fiction alone. Hence, the current study aims to provide the contextual basis for future research and expand existing knowledge of self-efficacy and the sources of self-efficacy in diving.

4.2. Method

4.2.1. Design.

A qualitative design was used to elicit discussion between groups of participants. The study aimed to use the participants' perspectives and personal experiences to highlight potential common themes in relation to self-efficacy in diving.

4.2.2. Participants.

An opportunity sample of two adult divers, (M = 38 years) and ten adolescent divers, (M = 14.5 years) were recruited to participate in this study. The adult participants began learning to dive in adulthood and were both competitive at a masters' level with an average experience level of two years. The adolescent participants all began diving as juniors and were competitive at novice, skills, age group and senior level with an average experience level of four and a half years. All participants were competing at a regional (N=5) or national level (N=7) at the time of the study. Participants were selected to ensure a suitable representation from each level of diving. Two participants aged 16 years and 15 years dived at novice level. Three participants aged 12 years, 14 years and 16 years dived at skills level. Three participants, two aged 13 years and one aged 14 years dived at age group level. Two participants aged 17 years dived at senior level and two participants aged 40 years and 39 years dived at masters level.

Participants were then split into two focus groups of six participants to ensure the group was small enough for all participants to voice their thoughts but large enough to ensure diversity and discussion (Lasch et al., 2010). Each focus group contained participants from different levels of diving to ensure diverse opinions and experiences were

discussed. Focus group one contained: two masters divers, one skills diver, one age group diver and two senior divers, in addition two of the divers in the group were at regional level and four were at national level. Focus group two contained: two novice divers, two skills divers and two age group divers, of which three were regional level and three were national level.

Inclusion criteria were set to allow for the investigation into the uses and perceived effects of self-efficacy in competitive divers. The criteria for inclusion included: participants were current competitive divers who had been active at a competitive level for at least one year and have previously experienced anxiety, physical or emotional difficulties during competition and skill acquisition. Divers were screened for competitive level using their competition history. Results of a diver's competitions are available in the public domain via a diving specific scoring programme known as DiveRecorder™. Divers previous experience of anxiety, physical or emotional difficulties during their diving was identified based on testimony from the divers.

4.2.3. Procedure.

Ethical approval was gained from the University Research Ethics Committee before any participants were contacted (see appendix J). All participants were recruited through a city-based diving club in the North-East of England via email invitation sent from the organisation's head coach. Emails were sent to approximately twenty potential participants who met the inclusion criteria. Twelve participants agreed to participate in the study. Participants were provided with detailed documentation highlighting the aims and expectations relating to participation in the study in age appropriate language. Adolescent participants were given information in language written for a key stage three reading ability. Participants were given the option to withdraw at any point before, during and up to two weeks after the focus group session. Participants were also given the choice to have a parent or guardian present, two participants requested their parent's presence, and both participants attended the second focus group.

Focus groups were used as the preferred method of data collection as they facilitate group discussion and gain multiple perspectives on issues in a supportive environment (Nepomuceno & Porto, 2010). The pragmatic philosophical underpinnings of the study suggest that reality is in a constant state of change and is re-negotiated

based on the situation (Creswell & Plano-Clark, 2007). Focus groups offer a method of data collection that is suitable and sensitive to a pragmatic approach as the discussion and ability to gain insight into different peoples perspectives offers a greater opportunity for knowledge. In addition, observational data and reflective comments from the researcher were recorded to report any non-verbal interactions that would not be recorded by the voice recording equipment used to document the discussions. Attendance to the focus group sessions was based on participant availability and training commitments. It was expected that many participants would be under the age of 18 years based on the demographics of diving as a sport, and focus groups with peers and teammates offer a supportive and less intimidating environment than interviews. The possibility of group thinking or pressure to conform is a limitation of focus groups (Dimitroff, Schmidt & Bond, 2015), however this can be offset by the experience, skill and sport-specific knowledge of the researcher conducting the focus group (Onwuegbuzie et al., 2010).

Two multi-perspective focus groups were conducted both with six participants. Before the focus group session began participants were asked to fill in demographic information to record their age, gender, level of diving and years of competitive experience. The focus groups lasted between 30-40 minutes. The focus groups were conducted using a semi-structured approach. A semi-structured approach to questioning using prompting questions aims to facilitate discussion on certain topics and reduce researcher influence as much as possible, the aim was to create an environment where the researcher can take on a structured eavesdropping role (Kitzinger, 1995). Existing research on the areas of self-efficacy and sports performance (Bandura, 1977; Feltz, Short & Sullivan, 2008; Samson, 2014) were used to design a set of five main questions written using an ideal style (see figure 5) and nine prompting questions written in an interpretive style (Kruger, 2000; Stewart & Shamdasani, 2014). To account for the lack of knowledge of self-efficacy theory and the age of participants the questions used simple, direct language. The questions focused on the perceived barriers and facilitators to performance within a diving environment. Additional prompting questions were used based on the answers given by the participants. The initial questions developed for the focus groups were presented to a diving coach and a psychology researcher for input and comment, following slight wording changes both professionals accepted the suitability of the questions for the subject matter and age of

the participants. In addition to data collected by the participants' verbal responses to the questions, the researcher took observational notes about the participants body language and facial cues in reaction to the questions asked and answers given throughout focus group session.

1. How do you feel when you learn a new dive?
2. How do you get over negative feelings to be able to dive?
3. What kinds of people inspire you in your diving?
4. How do other people affect your ability to dive?
5. How do your nerves affect you when you dive?

Figure 5: Focus group questions

4.2.4. Data Analysis.

Data collected from the focus groups was analysed using thematic analysis from a pragmatic perspective (Aronson, 1995). Both the focus groups were recorded and transcribed verbatim. For confidentiality reasons the participants were given different names. The focus groups were conducted and transcribed by the same researcher. The focus group transcripts were analysed using abductive reasoning by the researcher and an independent coder (Gale et al., 2013). During the analysis initial open coding was written in the margins of the focus group transcripts, as well as observational and reflective notes. Open coding requires assigning meaningful and descriptive expressions to the data points that could be later used to group the data (Vaismoradi, Turunen & Bondas, 2013), the expressions used were the five sources of self-efficacy and 'other' for any data points that did not fit. Responses were coded into meaning units and similar meaning units were grouped using abductive reasoning and compared to existing sources of self-efficacy to establish any diving specific influences on self-efficacy, this methodology was based on current research in sport psychology (Didymus, 2012; 2014; Samson, 2014). The second phase of analysis involved an independent coder, who was familiar with self-efficacy theory but not diving, who coded the transcriptions (Auer-Srnka & Koeszegi, 2007). The independent coder was not privy to the initial researcher's interpretations, in an attempt to reduce researcher bias. Inter-observer agreement was

93%, which was calculated by directly comparing both researchers independent interpretations of the focus group transcripts. A discussion between the researcher and the independent coder was conducted to reach a unanimous decision about the remaining 7% of analysis. Themes were identified through abductive reasoning using two major methods of theme identification; repetition, when phrases or opinions were mentioned frequently, and indigenous categorisation, which is the identification of phrases or words specific to the situation or sub-culture (Ryan & Bernard, 2003). Higher order themes were identified using both methods where as lower order themes were low in repetition, thus less descriptive of the wider diving community.

4.2.5. Validity and Rigor.

Triangulation, the use of different data collection methods and interpretation approaches (Smith, 2015), was used to ensure the credibility, dependability, transferability and confirmability of the research methods and findings (Shenton & Dixon, 2004). Data were collected using focus group transcripts, observational data from the focus groups and researchers reflective comments. Thematic analysis was taken from a pragmatic approach (Aronson, 1995). In addition, the study also used member checking, peer scrutiny and background knowledge to ensure the trustworthiness of the findings (Didymus, 2017). Details of the triangulation methods used during the study can be found in the studies audit trail (see appendix B). To ensure credibility of both the data collected during the study and the analysis the current study elected to use well-established methods of data collection and analysis within the field of study. Many similar qualitative studies in self-efficacy, motivation and sport have used focus groups as a method of data collection (Keegan et al., 2014; Saville et al., 2014), and focus groups are often used in studies with youth participants (McCarthy & Jones, 2007; Sharp et al., 2013). In addition, the data analysis approach was based on the thematic analysis from a pragmatic perspective (Aronson, 1995).

Another method of ensuring suitable credibility of the data collection and interpretation is ensuring the suitability, qualifications and background knowledge of the researcher involved in these processes (Onwuegbuzie et al., 2010). The same researcher conducted the focus group sessions and the primary analysis. The researcher has an extensive background in the sport of diving, competing to national level in age groups, seniors and masters categories along with holding a level two diving coaching

certificate. The researcher also holds academic qualifications in psychology and sport. The knowledge gained from a background in competitive diving, diving coaching and psychological research offers the researcher a strong position for credible interpretation of the data collected.

In addition to the protocol put in place during the research design there were checks conducted after the data collection to ensure reliability and trustworthiness. Member checking, which is the checking of data by gaining the consensus of the participant or group who provided the information (Flick, 2015), was conducted at several points during the study. Informal member checking was conducted through the focus groups, the researcher often repeated or re-iterated the participants' comments to ensure they had been heard properly and to give the participants chance to clarify their points (Onwuegbuzie & Leech, 2007). Findings were also exposed to peer scrutiny by the use of an independent coder who interpreted the transcripts in an attempt to limit the potential influence of researcher bias (Gale et al., 2013).

4.3. Results

Initial coding highlighted 40 meaning units that were condensed into main themes and lower order themes (see appendix B). Nine main themes were identified during the analysis, specifically: preparatory skills, family influences, coach influences, peer influences, competition, emotions, imaginary barriers, modelling, and memories. Three lower order themes were also highlighted: Imagery, control, and mood. The themes highlighted in the analysis will form the basis of the following discussion.

Table 2: Meaning Units, Themes and Sources

Meaning Units	Themes	Source of Self-Efficacy
Failure	Preparatory Skills	Mastery Experience
Over-confidence	Memories	
Positive Memories	Control	
Lead-ups		
Control		
Unknown Feelings		
Famous Divers	Modeling	Vicarious Experience
Peer Divers	Imagery	
Diving Media		
Live Competitions		
Modeling		
Imagery		
Parental Support	Family Influence	Social Persuasion
Arguments with Parents	Coach Influence	
Positive Coaching	Peer Influence	
Coaching Pressure	Competition	
Peer Pressure		
Support from Peers		
Wasting Peoples Time		
Audience		
Competition		
Others Opinions		
Self-Talk		
Courage	Emotions	Physiological and Emotional States
Anxiety	Imaginary Barriers	
Fear	Mood	
Boredom		
Panic		
Self-loathing		
Tears		
Self-doubt		
Joy		
Feeling Cold		
Shaking		
Invisible Wall		
Getting Stuck		
Bad mood		
Good mood		
Religion		
Money		

Table 3 – Saturation Grid

	Number of Participant Comments/Observations					
	Focus Group 1		Focus Group 2		Total	
	Positive	Negative	Positive	Negative	Positive	Negative
Preparatory Skills	4	3	5	2	9	5
Family Influence	3	4	3	3	6	6
Coach Influence	3	2	4	2	7	4
Peer Influence	4	2	8	1	12	3
Competition	1	4	1	5	2	9
Emotions	1	3	1	7	2	10
Imaginary Barriers	0	6	0	4	0	10
Modelling	4	1	3	1	7	3
Memories	2	4	3	7	5	11
Imagery	1	0	4	0	5	0
Control	0	2	1	1	1	3
Mood	2	1	0	2	2	3

4.3.1. Preparatory skills.

A number of participants highlighted that the preparatory skills they deploy before a new dive provided them with a strong confidence base and assurance that they are able to perform the next step. For example, in focus group one a participant suggested that “I’ve got to do everything in a certain order ... I’ve got to start with the basic and work up to the slightly less basic”. Out of the eight participants who mentioned using preparatory skills, only two participants mentioned any negative aspects, suggesting too many preparatory skills turned from a positive to a negative influence on learning new dives. An alternative view on preparatory skills, was offered by some participants in focus group one. Several participants suggested preparatory skills act as a safe zone creating a reluctance to try the more complex skills. One participant mentioned her tendency to overuse preparatory skills, which caused her to develop a habit of exiting the dive at a certain point making adding further summersaults very difficult:

If you do too many just back summersaults you’re programmed to come out and then when you actually go for the back 1 ½ it’s actually different because you kind

of need to hold on for a bit where as you're not doing that with the single summersault.

Several other participants in very similar ways expressed this different use of preparatory skills as both an encouragement and a safety net. One younger participant mentioned gaining confidence through the process of preparing for a dive using lead ups.

When you're working it up, once you've done that, you're confident with it and you feel like you want to do more. Like keep doing more and more, and if you just go for it, it will be a lot easier

4.3.2. Family influence.

Family influence was mentioned several times during the discussions. The difference in the effect of positive family input and negative family input on perceived diving ability was clear. A number of participants mentioned the negative impacts of comments and actions from their family in relation to their diving performance and motivation to attempt new skills. A participant in focus group one gave an example of a common interaction with their parents in relation to diving:

Our parents think that they are some form of Olympic coaches, I'm not even kidding. They think they know everything, they are like oo 'that wasn't very good, that one was a bit over, that would only be a four', it really irritates you. So you don't do it even more so they can't comment.

Several participants mentioned a similar set of circumstances relating to parents taking a coaching role; most participants saw this as having a negative effect on their diving and their relationship with their parents. Several participants mentioned how poor performance in diving sessions would often result in arguments with parents after the session.

When I didn't go for a dive my mam would get annoyed, then I'd get annoyed and then we would argue, and I would be like I never want to go back diving again and she'd be like yeah that's fine I'm never going to take you again you're not going to get anywhere. But then when I do get a dive she'd happy but if I don't do a dive she's angry

Other participants highlighted the positive comments and encouragement they got from their families and how this input made them feel better about their diving:

When I'm scared to do a dive I always look over to my mam when she's there or my dad when he's there, and they always give me the thumbs up saying you can do it, so that really helps us.

Another participant mentioned how her parents struggle with her diving and try to be positive but fear for her safety.

I'm glad our parents aren't there because if I go back and I say I've done a new dive, they are like oh my god what have you been doing. It's more like she doesn't want me to do the new dives because she doesn't want me to hurt myself.

Other participants also mentioned the positive input of parental feedback, with many mentioning non-verbal feedback such as clapping or smiling having a positive effect on their diving and their willingness to try a new dive. Observational data collected also highlighted the unwillingness of certain participants to speak while their parents were in the room. "Daisy remains silent and often looks to her mother when questions are asked. She may not be speaking due to her mother's presence. Daisy offers no comment when the discussion turns to parental input".

Adult divers were also asked how they felt their children affected their approach to new and more complex dives. Both adult participants mentioned how the children in their life were a positive influence on their training and provided social support and encouragement.

They are mint, they're great, every time I've dived with this lot and I do something they are always like really really brilliant just fab. I can splat and they will support me or if I get something right they are the first to cheer and its really nice.

4.3.3. Coach influence.

Coach influence emerged from the focus groups as the effect that the coaching staff could have on a divers ability, belief, motivation and mood in and out of the diving environment. The participants included in the focus groups had more positive points about their coaching staff than negative comments. The majority of the comments about coaching influence highlighted the positive effects of the coaches' support and skill. Participants mentioned the support their coach offers during skill acquisition

“When he’s calling me out it makes me feel better ... you’ve just got to trust him”. Also participants mentioned their coach’s experiences as a diver and how their coach influenced their diving:

I think the coaches really inspire you, especially when they’ve had past dives because they know what you’re going through kind of thing, and the feeling when you’ve done it, the achievement, when you go home you feel really happy and positive

When talking about their trust in their coach one participant reflected:

I guess I’m more reliant, if my coach tells me to do it then I guess he wouldn’t tell me to do it if he didn’t think I could do it, so I say right ok I’m going to give it a go. But what else do I have to go off, and he definitely wouldn’t ask me to do something he really didn’t think I was going to do because its not in his interests for me to get hurt the same as its not in my interests to get hurt.

This positive impact of the coach in relation to skill acquisition was a common theme in the current study; many participants mentioned that their coach has a big impact on their approach to attempting new or frightening skills. There were limited negative comments about coaching staff, but these comments seemed to focus on the pressure that coaches put on the divers. One participant offered an example of an interaction with a coach that they felt was negative:

He’s trying to push you as hard as he can but it’s really nerve racking. You feel like, will he go off it at me if I don’t do it or will he be ok and be like you will get it next time.

A few participants in the current study did mention that they felt pressure from their coaches but most did not see this as having a negative impact on their diving, some even mentioned a specific behavioural cue that their coach had when their mood was changing, “It’s like when he sits on his step” and another participant added “that’s never good”, which provided a level of amusement for the divers.

4.3.4. Peer influence.

Peer influence in the current study relates to the social persuasion source of self-efficacy beliefs. The impact of the divers’ peers on the individual’s overall enjoyment and performance in diving became apparent during the focus groups. Many participants

had very similar opinions of both positive and negative effect their peers had on their diving. Positive comments often centred on the support and camaraderie of the team environment. For example, one of the participants reflected that:

A lot of my team mates have a positive effect because its obviously support and it keeps you going, especially with people your own age because you can relate to them more, because they know what you are going through socially and at school and that.

The positive influence of peers on divers training and performance was evident in the comments from participants, with many mentioning positive peer feedback both verbal (e.g., cheering and nice comments) and non-verbal (e.g., clapping and splashing the water). Another participant mentioned how she gained social support and motivation from divers her own age and ability, "I think we support each other through the downs and celebrate everybody's ups, and its really really good."

There were only three negative comments about peer influence, in contrast to 12 positive comments, but the points raised mainly were about the effect of their teammates moods and negative verbal comments. One participant mentioned an example of a teammate's reaction after the participant had performed a difficult dive for the first time "When they are in a bad mood they are just like woo (sarcastic cheer) and really like depressed". Another participant mentioned that the amount of other divers in a session often affected her decision to attempt new dives, mentioning she preferred to do new dives when there were less people around to watch her:

I prefer to do new dives when it's quiet. Plus I don't have loads of people watching which makes me feel more like I can do it. When it's too busy, like Monday night sessions, I can never do a new dive on them, it's got to be on Thursdays

The majority of comments about peer influence were positive. However, the club featured in the focus groups is a mid-level club and not a highly competitive centre of excellence. Also all the participants were teammates and this may have affected what the participants were willing to share.

4.3.5. Competition.

A number of comments were made about the competitive environment within diving. The comments mainly surrounded being compared with each other and constantly competing to be number one, both in competitions but also in training. Several participants commented on the effect that the highly competitive environment of diving had their diving performance and approach to training. Some participants mentioned the detrimental effect of a competitive environment, "If they are doing all the dives you wish you could do it can sometimes put you down because you feel like you will never be able to do that".

Participants discussed how comparing themselves to others in a competitive situation had a negative effect on their opinions of their own diving:

I kind of compare myself now as I've got older and lost so many dives, because obviously when you're younger you are more confident. When I get on the board I will say I wish I was younger because I was more confident, and then I would be able to fling myself off the board like everyone else does and I wouldn't be scared of hurting myself, but yeah I do compare myself quite a lot, because I've kind of gone downhill

Yet other participants highlighted the motivational aspects of a highly competitive training environment, "The fact is I really wanted to do it because everyone else was doing it". Although some participants made comments about the motivational effect of competition most highlighted the detrimental effect of a highly competitive environment.

4.3.6. Emotions.

Emotions were mentioned by most of the participants at some point in the discussion. There were several emotions that were more commonly mentioned than others but most participants recognised that their emotional state had a noticeable affect on their diving performance and enjoyment. Fear and anxiety were emotions felt by the majority of participants in relation to their diving, one participant illustrated their interpretation of fear, "the biggest thing of learning a new dive that stops me is the fear factor obviously, and it's just the fear of splatting and hurting yourself". Participants mentioned similar emotions such as anxiety, panic, and self-doubt; these emotions seemed to go hand in hand with fear but were described as an intense feeling that

halted progression. One participant recounted a memory of extreme panic “I think I’m going to do the dive until I get onto the board and then I have a panic attack and don’t do it”. Participants who experienced self-doubt about their ability to dive also seemed mention times when the feelings intensified it resulted in feelings of self-loathing and sometimes resulted in tears. A different participant mentioned feelings of self-loathing when discussing a long-standing difficulty with a particular dive “I feel as if I can’t do anything when I can’t do that particular dive”. The participant also started to show signs of distress when recounting her emotions during the period of difficulty she had experienced.

When discussing not attempting a skill Holly describes a long standing skill she struggled with for several years until very recently. She began to show signs of distress when recounting how she felt when she could not perform the skill. Despite the potential research interest of this reaction, I (the researcher) quickly moved the discussion on, as I (the researcher) am concerned at causing a child distress. (from observational notes)

Although the majority of the discussion revolved around negative emotion there were some positive emotions mentioned, including feelings of courage and joy. An example was given by participants in focus group two, which centred on the feeling of joy after a successful dive “When you’ve done it, the achievement, when you go home you feel happy and positive”. Another participant mentioned how a good session has an effect on the rest of their day, “After a good session you feel like you can do anything”. Overall emotional responses were highly mentioned by most participants, with a strong connection to skill acquisition.

4.3.7. Imaginary barriers.

The mention of imaginary or unexplainable barriers was a consistent theme in the discussions that took place. Participants seemed to recognise they felt a certain way but could not rationalise why or how those feelings emerged. One participant attempted to describe how they feel when experiencing their imaginary barrier, “even if I feel I’m ready to do it there feels like there is a barrier that stops me”. Some participants mentioned the feeling that the imaginary barriers were internal, describing a fracture between the body and mind “I stand there for ages and my body just won’t want me to go” and described situations where they felt their body and mind were separate entities “your mind wants to go for it but your body just wont let you”. Whereas other

mentioned their feelings that the imaginary barriers were external and not in their control, "It feels like you can't start you're hurdle step because you're stuck to the board".

These imaginary barriers seem to have a particularly profound affect on divers and when recounting the situations they experienced these barriers certain participants became visibly distressed at the memory or annoyed that they couldn't find the words to describe their experiences. The observational notes taken in focus group one highlighted the difficulties participants had articulating their feelings about their barriers: they (the participants) seemed to display a level of frustration that they (the participants) cannot describe the feelings they (the participants) experience. When asked to expand on their comments about their barriers most participants struggled to find the words and stopped talking. A similar situation was seen in focus group two in which a participant mentioned the effect of an invisible barrier but displayed very similar non-verbal reactions when attempting to explain it.

Ruth mentions a 'barrier' she cannot describe that stops her. As she describes it its clear she cannot articulate fully what she wants to say, she takes her time to try and find the words but still struggles, displays a level of frustration and eventually moves the conversation on. (from observational notes)

4.3.8. Modelling.

Most participants mentioned watching diving or modelling others behaviour in some form and the effects of this on their attitudes and approaches to their diving. Some participants mentioned watching divers they admire, such as Olympic champions, and the positive reactions this had on their feelings about their own diving. When asked what kinds of people inspired their diving, one participant in focus group one mentioned several high level and Olympic divers, "A lot of the 3 metre divers, Jack Laugher, Chris Mears, Yona Knight-Wisdom. All the good ones." A participant in focus group two mentioned a very similar reaction when asked who inspired them:

The people who inspire me are on the TV like I said, in Tom Daley, Jack Laugher, Chris Mears who have won past Olympic, European and worlds which I find really impressive and you think I want to do that kind of thing and that's what makes me have the motivation to do diving

Another participant mentioned that watching elite level divers helped them to set and achieve their own targets by drawing off the journey and experiences of higher-level divers.

I enjoy watching it as well and I really think it is inspiring, because it makes you go wow. I mean I'm never going to aspire to do 3 ½ summersaults off 10 meters but it doesn't mean I can't aspire to do more than I can currently do. And they've all had to go through it at some point too haven't they,

Other participants mentioned that watching competitions in person or via digital media made them feel that they could achieve the level of performances they were watching. One participant detailed their reaction to watching a recent televised competition.

If I watch a competition, I will be like I'm the new Olympic diver and I can try everything but then realistically when I come to the pool reality hits us and I'm like I'm never going to make it.

The short lived effects of modelling were apparent by many participants commenting on the positive effect while watching the competition but the effects wore off by the time the diver got to their training. These short-lasting effects also changed into negative influences in some participant's experiences, with some participants mentioning their mood dropping when they compared themselves with the divers they were modelling. The negative effect of modelling others divers seemed to be magnified when the person being observed was an opponent. One participant mentioned the negative affect of watching others of a comparable level, "I try not to watch other people in competitions because it just makes me feel rubbish".

4.3.9. Memories.

Participants mentioned both positive and negative memories having an effect on their diving. One participant recounted a memory held in a very positive light, "I can remember when I was doing two-and-a-half off three and I was just thinking you can do it, even if you don't do it, it will just be like falling on a soft pillow with everyone splashing", this memory refers to a time that the participant attempted a dive that was at the top end of his ability. The positive memory gained from this experience has helped the diver keep themselves motivated to keep pushing forwards. The motivation gained from past experiences was evident when the diver used the same an example in

a later discussion, "If you were too scared to do two-and-a-half there is no chance you would try a triple". Yet many participants referred to the detrimental effects of negative experiences on their future progress. Highlighting that past failures made them feel as if they were unable to move forward. A participant in focus group one explained how their negative memories affected their attempts to improve, "Your mind wants to go for it but your body just won't let you, because it knows there is an outcome at the end, whether it's entering well or smacking".

4.3.10. Imagery.

Techniques used to reinforce positive memories and adapt or alter negative memories were an area discussed by a smaller number of the participants. As all the divers came from the same club the techniques used were consistent with those taught by the coaching staff. Imagery is a technique where by the diver imagines the dive in their head from start to finish, imagining the different outcomes and what areas of the dive they need to be more aware of during their performance. To use a diving example, divers must be aware of their surroundings to locate their spot, the area of the environment they use as a cue for exiting the summersault or twist. Within a diving environment imagery is also known as visualisation. The use of imagery seemed to be consistent among the small number of participants who mentioned using the technique. One participant detailed how they used imagery in their training "I watch myself doing the dive in my head and see myself doing it from different angles". Another mentioned imagery when asked how he overcame negative feelings towards new dives, "I visualise it". A similar comment was made by another participant in a different focus group in response to the same question, "Imagine yourself doing it, run through the routines for it all and the lead ups to get in the right frame of mind for it".

4.3.11. Control.

The theme of control was not mentioned by a large proportion of the participant group, however the severity of the reaction to the topic of control and loss of control highlighted it as an interesting point of investigation. One participant mentioned not being able to explain the processes that they experienced "I don't know what goes through my head" again this declaration was coupled with nervous body language and difficulty with eye contact. The observed physical reactions to the discussion of loss of control was evident in all participants who mentioned loss of control as a negative

influence on their diving, but the experiences differed dramatically between participants. When participants in focus group one were discussing why they felt they didn't have control over their bodies they appeared to "display a level of frustration that they cannot describe the feelings they experience". The theme of control was evident in discussions surrounding the other themes, many divers mentioned using preparatory skills to maintain control and that preparatory skills had to follow a specific order, "I've got to do everything in a certain order".

4.3.12. Mood.

Participants mentioned the effect that their mood had on their diving experience, and how this affected their confidence and motivation. Participants mentioned the effects of both good moods and bad moods, for example "It depends what mood you're in, if you're not feeling it at the start you're not going to do it, if you're in a bad mood it's not going to happen". Although this theme was not mentioned by many of the participants, the participants who mentioned the effects of their mood commented with surprising consistency. In addition to divers mentioning their mood had an affect on their approach to learning new skills it seemed evident that the effects on their mood stayed with them long after the training session. Observational notes from focus group two demonstrated the effect of diving on mood. One participant discussed her feelings towards a particular skill she struggled with and within minutes of discussing the skill her mood had completely changed, "Holly's demeanour changed very quickly when discussing her reverse dive, she became visibly upset within seconds of beginning to discuss the experience".

Another participant mentioned how other people's mood affected their own mood and attitudes towards attempting new or more complex dives, when talking about how her coaches mood affected her diving one participant mentioned:

Sometimes if he's in a good mood I'm more likely to do it, I think oh you're being nice to me today so I will do this so it makes you feel better. But if he's in a bad mood I'm just like, either I will do it to put him in a good mood or I'm like nah. I'll stand at the side and not do it.

A similar sentiment was mirrored in another participants' discussion of how the mood of their teammates affected their mood and approach to new dives.

It partly comes back to what everybody else has said, it comes down to mood, if you're in the right mood to be going you know they've done it so you do it, at the right time and when everyone in is in the right mood it can help because it can spur everybody on.

4.4. Discussion

The aim of the current study was to explore how divers use self-efficacy and if there are particular aspects of self-efficacy theory that divers feel are more influential than others. The themes highlighted in the current study offer a suitable fit to Bandura's (1977) model of self-efficacy. The themes of preparatory skills, memories and control fit well with the category of mastery experience. Modelling and imagery fit into the category of vicarious experience. Family, peer, coach influences and competition environment fit within the category of social persuasion. Imaginary barriers, emotions and mood cover the categories of physiological and emotional states.

When the themes were coded into Bandura's (1977) model it appeared that mastery experience and emotional states were the most mentioned sources of self-efficacy based on number of times each theme was mentioned by participants. The current findings are consistent with research in other sports. Findings of similar research exploring self-efficacy in golf (Valiante & Morris, 2013), marathon running (Samson, 2014) and many more sports (Machida, Ward & Vealey, 2012) demonstrated the influence of all five sources of self-efficacy on perceived ability. In the current study divers highlighted a total of 12 themes that covered the five sources of self-efficacy. Findings by Chase, Magyar and Drake (2005) presented similar results in the sport of gymnastics, when a group of 10 female gymnasts mentioned a total of 20 themes that covered the five sources of self-efficacy.

The findings also support the opinions presented in diving literary non-fiction, such as biographies, autobiographies and memoirs of divers and coaches. In several diver's biographies and autobiographies the influence of peers, parents, coaches, negative memories and emotions are strongly eluded to (Boudia & Ellsworth, 2016; Mitcham & Writer, 2012; Russell, 2009). In addition, Leon Taylor, the 2004 GB Olympic silver medallist, in his book detailing his move from diving to mentoring he proposes the potential positive influences of modelling and role models on divers performance and well-being (Taylor, 2011). The detrimental effect of emotion on diving experience and performance presents as an area for future inquiry, to highlight if the high level of

emotion experienced by divers could be affecting not only their performance and future diving development, but also their psychological wellbeing. The way in which participants described the influence of imaginary barriers on their belief in their ability to dive was also consistent with the literary non-fiction in diving (Boudia & Ellsworth, 2016; Daley, 2011; Mitcham & Writer, 2012; Russell, 2009).

One major limitation of the current study was that participants struggled to accurately vocalise their experiences especially in relation to imaginary barriers. Often participants struggled to find the right words and only offering simple statements describing a barrier or invisible wall that they were unable to pass. Whereas other participants described their body as a separate entity they couldn't control when faced with the imaginary barriers to learning new dives, using words phrases such as my body just wont want me to go. Conversely, others described the experience of imaginary barriers as an external force acting on them, describing feeling stuck or frozen to the board. The level of inconsistency in relation to the discussion of imaginary barriers could have been due to the age and language ability of the participants, a reaction to the dynamics of a focus group setting, or even a reaction to the recent nature of the difficult memories (Adams & Cox, 2008; Van der Volk, 1998). Further research should aim to gain more detailed insight by potentially using individual interviews or older participants to combat the limitations of the current study. Nevertheless the current study provides support for the existing literary non-fiction in relation to divers experiences, motivations and struggles with suitable scientific rigor to act as a foundation for future research.

4.5. Conclusion

The current study provides a suitable foundation for research into the relationship between self-efficacy and diving by providing reliable and detailed insight into the influences, motivations and psychological struggles associated with divers performance. However the current study was limited in the ability to contextualise the cause of imaginary barriers in diving, which could have been due to the age of the participants. More research is necessary in the area of imaginary barriers and emotions to attempt to narrow down a more specific cause. Further qualitative inquiry with older or retired divers could offer further insight into imaginary barriers and the effect on diving performance. Additional qualitative research with a different sample of divers could be used to corroborate the current studies findings before moving on to more

quantitative enquiry into the self-efficacy performance relationship. To this end, a second qualitative study was designed to address barriers and facilitators to diving. Furthermore, to address the limitation of adolescent divers articulation and language seen in study one, study two aimed to used a sample of retired divers who may be able to provide more detailed and articulate responses.

5.1. Aim

The main aim of study two was to use interviews with retired divers to gain an in depth insight into the use and perceptions of self-efficacy, with a specific focus on their experience of physiological barriers, emotions and mental block. A secondary aim of study two was to provide further context for the development of a self-efficacy scale specifically for use within a diving community and a base of knowledge for the development of further diving performance research. The findings of study one suggested that divers do potentially experience the effects of the five sources of self-efficacy on the perceptions of their diving ability, specifically physiological and emotional states. The small amount of existing literature in the field of diving further supports the importance of self-efficacy in diving (Highlrm & Bennett, 1983; Reed, 2002; Rymal, 2007; Slobounov et al., 1997), also supporting the importance of physiological and emotional states in diving (Feltz & Mugno, 1983; Pattinson, Cotterill & Leyland, 2016).

The current study design used interviews with retired divers to facilitate more detailed discussion of the imaginary barriers and mental block that was not possible in study one due to the age of the majority of the participant sample. It was expected that retired divers would be able to better articulate the causes and effects of mental block and imaginary barriers on their perceptions of their diving ability than younger divers. To address the articulation limitations of adolescent divers presented in study one, study two used a sample of retired divers. Existing literary non-fiction within diving comes from current and ex-divers. The literature presented by retired divers or divers over the age of 20 years old is more detailed and in depth when discussing difficult memories. The ability for older athletes to convey opinions and experiences in a more detailed manner is consistent with existing research suggesting children do not have the same ability or vocabulary to articulate and express emotional constructs in the same way as adults (Aldridge & Wood, 1997). In addition, retired divers may find recollection of difficult memories and experiences easier as they are no longer immersed in the diving environment. Research regarding memory recollection supports this by suggesting that disassociation and difficulty recalling memories can ease over time, and people are

often more able to recall difficult memories when they regards themselves in a safe place in their lives (Brown & Schefflin, 1998; Malmo & Laidlaw, 2010).

5.2. Method

5.2.1. Design.

The current study utilised a qualitative design, using semi-structured interviews as a data collection strategy and thematic analysis with open coding. Semi structured interviews were selected to allow for the participants to explore their own feelings and opinions but also allow the researcher to focus and clarify certain points using probing questions (Barriball & While, 1994). A Semi-structured interview with open-ended questions is often seen as the 'gold standard' methodological approach when conducting qualitative research (Barbour, 2008). In addition, the current study was designed as an extension and corroboration of the initial qualitative study (see chapter three), therefore the use of interviews can offer a different, more detailed perspective than that of the focus groups used in the previous study. Interviews can be used alongside focus groups to offer individual perspectives and ensure complete data saturation (Fusch & Ness, 2015; Rubin & Rubin, 2012). Existing research in the fields of mental block and self-efficacy was used to develop a set of seven questions written in an interpretive open-ended style designed to encourage discussion (Stewart & Shamdasani, 2014) around mental block, as well as the barriers and facilitators to overcoming mental block and imaginary barriers in diving. Additional prompting questions were used based on the answers given by the participants.

Research by Bruton, Brundrett and Jones (2008) presented four main methods of interviewing, which included face-to-face interviews, telephone interviews, online interviews via written format such as email, and finally synchronous web conferencing such as video chat. The current study chose to use synchronous web conferencing for several reasons. Due to the geographical location of the participants there would have been a considerable cost associated with face-to-face interviews, so synchronous web conferencing allowed for a cost effective way of interviewing without losing the potential observational information gained from a face-to-face interview which is lost via telephone or written forms of interview (Deakin & Wakefield, 2014; Hanna, 2012). Although there were also disadvantages of a web based interview approach such as technical difficulties, access to software, dependence on internet connectivity and a

requirement for participant to be technically competent with the software. Technical competency was not deemed a problem as all the participants were comfortable with the use of synchronous web conferencing through their work. Research by Lo Iacono, Symonds and Brown (2016) and Sullivan (2012) have found Skype™ to be a viable alternative to face-to-face interviewing for qualitative research, by allowing for the collection of data from a worldwide sample without the associated time and financial restraints allowing for more diverse research samples.

5.2.2. Participants.

An opportunity sample of three retired divers was recruited to participate in the study. An invitation to participate in the study was posted on the social media platforms Facebook™ and Twitter™, and was shared by several online diving community groups. Five potential participants responded to the online invitation but after scheduling conflicts two participants had to remove themselves from the study. All participants had competed at a least a national level at senior or junior elite standard, and were no longer involved in elite level diving. Divers were screened for competitive level using their competition history; results of divers' competitions are available in the public domain via a diving specific scoring programme known as DiveRecorder™. All participants had reported suffering from mental block or barriers to their diving progression at least once in their diving career when answering screening questions via email.

The first participant was Tony, a 34-year-old retired diver who dived for several diving clubs across the south of England during his career. Tony began diving at the age of seven years and competed at varying levels during his junior career, before competing internationally at the age of 24. Tony retired from diving at the age of 25 following an injury to his inner ear. The second participant included in the study was Martin, a 23-year-old retired diver, who dived for the same diving club in the north of England for his whole 11-year career. Martin began diving at the age of eight years old, competing in skills and age group level as a youth, followed by one season in senior elite level at the age of 18 years. Martin chose to leave diving at the age of 19 years to pursue an alternative career. The third participant in the current study is Kathryn, a 20-year-old retired diver, who dived for the same diving club for her whole career. Kathryn began diving at the age of six years and competed at skills, age group levels and junior elite

level as a junior. Kathryn left competitive diving at the age of 18 years as a result of missing selection to an elite team. She chose to pursue a university education, however she is still involved in diving in a coaching capacity.

5.2.3. Procedure.

Ethical approval was gained from the University Research Ethics Committee before any participants were contacted. Participants were recruited indirectly via the social media platforms Facebook™ and Twitter™. Participants interested in the study then replied via email directly to the researcher. All participants consented to be involved in the study. Participants were screened for competition ability and previous experience of mental block using questions via email and existing competition information stored on DiveRecorder™. Participants were provided with information about the aims and expectations of the study as well as detailed procedural information about their commitments to the research in language suitable for a secondary school reading level. Recruitment was voluntary and the opportunity to withdraw from the study at any time was made clear to all participants throughout the process. Before the interview began participants were asked to provide demographic information to record their age, gender, years of diving experience, age at retirement and reason for retirement.

Semi-structured interviews were conducted via Skype™, along with the collection of observational data and researchers reflective comments. Participants were contacted at a pre-arranged time that suited their commitments; all participants were interviewed online in their own home. All participants requested interviews after 5pm to fit in with work commitments. Following initial checks of connectivity to ensure an uninterrupted interview, the interview progressed. The interviews lasted between 20 minutes to 45 minutes. A sound recording device was used to record the interview, and no video was recorded.

5.2.4. Data Analysis.

Data collected from the interviews was analysed using thematic analysis from a pragmatic perspective (Aronson, 1995). All interviews were recorded and transcribed accurately. The same researcher conducted all three interviews. For confidentiality reasons names of the participants and any person they named during the

interview were changed. To reduce the possibility of researcher bias transcripts were analysed and interpreted using abductive reasoning by the primary researcher and then transcripts were analysed by an independent coder, the both researchers findings were compared (Gale et al., 2013). The analysis used was modelled on the analysis used in study one. Transcripts were annotated, and then meaning units were developed from the original annotations, followed by similar meaning units being grouped into themes, based on analysis used in existing research in self-efficacy (Samson, 2014). The second independent coder, who was familiar with self-efficacy theory but not diving, then analysed the transcripts using the same process and was not privy to the original analysis. When meaning units and themes from both coders were compared inter-observer agreement was 96%, which was calculated by directly comparing both researchers coding. A discussion between the researcher and the independent coder was conducted to reach a unanimous decision about the remaining 4% of analysis. Themes were identified through abductive reasoning using two major methods of theme identification; repetition, when phrases or opinions were mentioned frequently, and indigenous categorisation, which is the identification of phrases or words specific to the situation or sub-culture (Ryan & Bernard, 2003). Higher order themes were identified using both methods where as lower order themes were low in repetition, thus less descriptive of the wider diving community.

5.2.5. Validity and Rigor.

Triangulation, the use of different data collection methods and interpretation approaches (Smith, 2015), was used to ensure the credibility, dependability, transferability and confirmability of the research methods and findings (Shenton & Dixon, 2004). Data were collected using interview transcripts, observational notes and researchers reflective comments. Analysis was taken from a pragmatic approach, yet the study also used member checking, peer scrutiny and background knowledge to ensure the trustworthiness of the findings. Details of the triangulation methods used during the study can be found in the study's audit trail (see appendix C).

To ensure credibility of both the data collected during the study and the analysis, the current study elected to use well-established methods of data collection and analysis within the field of study. Many similar qualitative studies in self-efficacy, motivation and sport have used individual interviews as a method of data collection

(Chase, Magnar & Drake, 2005; Samson, 2014; Valiante & Morris, 2013), and many studies exploring athlete experiences and motivations have opted for an interview approach (Buning & Thompson, 2015; Lee et al., 2009; Threlfall, 2014). In addition, the data analysis approach was based on the well-established pragmatic approach (Aronson, 1995).

Another method of ensuring suitable credibility of the data collection and interpretation is ensuring the suitability, qualifications and background knowledge of the researcher involved in these processes (Onwuegbuzie et al., 2010). The same researcher conducted the interviews and the primary analysis. The researcher has an extensive background in the sport of diving, competing to national level in age groups, seniors and masters categories along with holding a level two diving coaching certificate. The researcher also holds academic qualifications in psychology and sport. The knowledge gained from a background in competitive diving, diving coaching and psychological research offers the researcher a strong position for credible interpretation of the data collected.

In addition to the protocol put in place during the research design there were checks conducted after the data collection to ensure reliability and trustworthiness. Member checking, which is the checking of data by gaining the consensus of the participant or group who provided the information (Flick, 2015), was conducted a several points during the study. The initial questions developed for the interviews were presented to a diving coach and a psychology researcher for input and comment, following slight wording changes both professionals accepted the suitability of the questions for the subject matter and age of the participants. Informal member checking was conducted through the interviews, the researcher often repeated or re-iterated the participants' comments to ensure they had been heard properly and to give the participants chance to clarify their points. Findings were also exposed to peer scrutiny by the use of an independent coder interpreted the transcripts in an attempt to limit the potential influence of researcher bias (Gale et al., 2013).

5.3. Results

The current study highlighted both barriers and facilitators to the overcoming of mental block and imaginary barriers in diving. Four higher order themes were identified

in relation to the barriers related to overcoming mental block in diving: emotions, loss of control, poor coaching and physical sensations. Four higher order themes were also identified in relation to the facilitators to overcoming mental block in diving: preparatory skills, team mates, good coaching and learned skills. For reader clarity the each higher order theme is presented separately, yet due to the qualitative methodology only the most common lower order themes will be described. Full details of all lower order themes can be found in figure 1 and 2, along with an indication of the amount of participants who mentioned each theme in brackets.

5.3.1. Barriers.

5.3.1.1. Emotions. Participants were asked to describe their experiences of mental block and how they felt their mental block was affected by or directly affected their emotions. The three participants mentioned eleven different emotions in total. The most frequently mentioned emotions were fear and frustration. All three participants felt that fear was the root of their mental block, when asked what they thought caused their mental block, two of the participants responded immediately with the word fear. All three participants, in quite similar contexts, mentioned frustration. One participant highlighted frustration as a major barrier to their diving, 'I used to get so frustrated, that was the main problem with me, I would get so frustrated'. Another participant mentioned that they felt frustration played a large part in their emotional reaction to mental block, 'frustration was the biggest one, because you know you can do it but you get annoyed with yourself that you're not actually trying it'. Other more extreme emotion were also mentioned including self-hatred, '... beating myself up outside the pool', and embarrassment '... you're going to look silly'. Another point that was made by one diver was that removing themselves from the situation was the only way be could cope with their emotions, 'the best thing that worked was quitting diving for three years'.

5.3.1.2. Loss of control. The main theme of loss of control is made up of four lower order themes; poor landings, loss of spatial awareness, unknown outcomes and interruption of thought process. All three participants highlighted that a loss of control fed into their mental block and was a barrier to overcoming it. Participants mentioned that the root of mental block could come from poor quality landings, which are know in diving as splats. The participants recounted times they had experienced poor quality

landings, which had caused injury, 'I landed on completely flat on my front and hurt myself quite badly and was sick because of it' and 'I landed flat on my back, I don't know how I managed it'.

One participant also mentioned that they experienced a sudden loss of spatial awareness, 'I just completely lost where I was' which feed into their feelings off a loss of control. The more abstract concept of an unknown outcome was mentioned by one participant, which suggests that not knowing the outcome of a new skill causes a level of anxiety that feeds into mental block. One participant recounted 'the main thing that stopped me learning new dives was being scared of not knowing what was going to happen when I tried a dive for the first time'. The fourth lower order theme mentioned within the category of loss of control was the interruption of thought processes. Interrupted thought processes was mentioned by the youngest participant, Kathryn, who struggled to articulate how she felt at the point of mental block and described not being able to think as she normally would, 'I couldn't even work out how to do it anymore, it was definitely a mental block because I couldn't think it through anymore'.

5.3.1.3. Poor coaching. The third higher order theme identified in the transcripts was poor coaching, which consisted of five lower order themes; lack of attention, rushing the diver, lack of variety in coaching style, lack of diving knowledge and lack of belief in the coaches ability. One participant mentioned that the lack of attention from their coach caused frustration and affected their diving progression, 'Sometimes when I didn't get comments after a diving I would get so annoyed because he was concentrating on other people and there was just no balance'. Another participant mentioned their coach would rush them to try new skills and not adjust the coaching styles to help overcome mental block, 'Rushing through one method of doing lead ups, one approach to lead up as appose to say putting me in the gym or a rig or various things like that'. Two of the participants mentioned their reluctance to try new skills was affected by their coaches diving knowledge. Kathryn mentioned a strained relationship with one of her coaches 'I just felt she didn't know enough about diving and I sometimes felt like I know more than she did and she was supposed to be coaching me'. Also a lack of belief in the coaches ability to coach was highlighted as a cause of anxiety by the participants. Tony recalled a lack of belief in one of his coaches slowed his diving progression dramatically, 'another coach who is supposedly a high level coach, I

just didn't get on with and didn't believe they were very good at coaching so I didn't progress and I found learning new dives with that person exceedingly scary'.

5.3.1.4. Physical sensations. The final higher order theme highlighted as a barrier to overcoming mental block in diving was physical sensations. Participants highlighted several different physical sensations they felt held back their diving progression; muscle spasms, sickness/nausea, lethargy, dizziness and pain. Two participant mentioned experiencing muscle spasms and shaking while trying to learn new dives which they felt contributed to their mental block. Martin recalled how his physical reactions held his diving progression back 'the biggest one was legs shaking, my muscles would start twitching back and forth, my knees would go weak and that's when you loose parts of your strength in your muscles'. Participants also mentioned feeling sick when attempting new dives, 'stood on the board and you are so nervous, I don't think you would ever be sick but you feel sick'. Another physical sensation mentioned was pain, one participant mentioned feeling physical pain while experiencing mental block, 'If I didn't go for a dive I would feel physically in pain'. Lethargy and dizziness were also mentioned as contributing factors to the inability to attempt new or previously automatic skills.

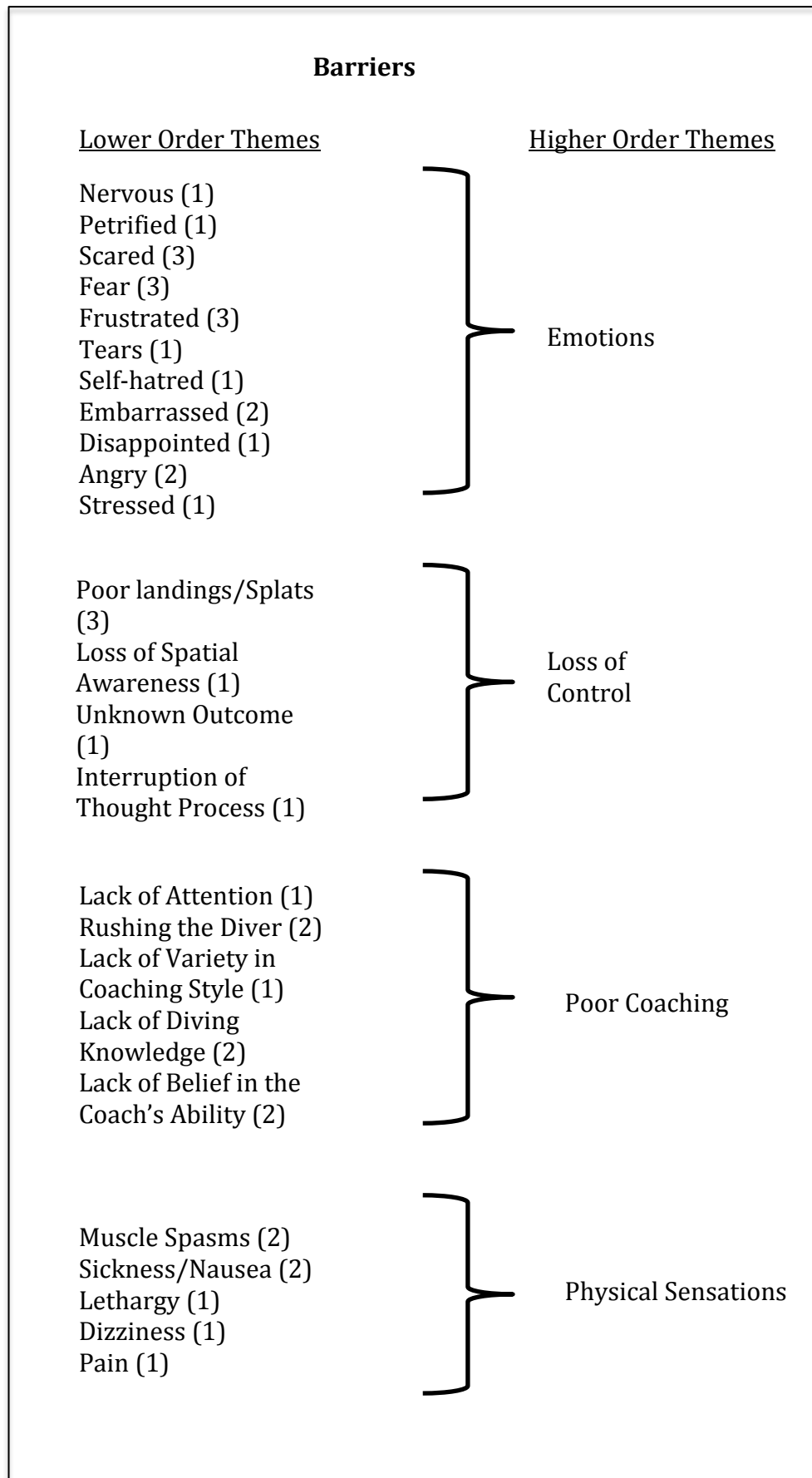


Figure 6: Barriers to overcoming mental block in diving.

5.3.2. Facilitators

5.3.2.1. Preparatory skills. One main facilitator mentioned by all three participants was the use of preparatory skills, known in diving as 'lead ups'. Participants mentioned feeling better and more prepared for new or lost skills after going through a progression of lead ups, 'There is a bit of an adrenaline rush from wanting to do it, doing the lead ups for it and wanting to do it, then just going for it'. The participants also mentioned wanting to do more lead ups and using the preparation phase as a safety zone, 'I would always want to do more lead ups than necessary to convince myself I can do it'.

5.3.2.2. Teammates. Another higher order theme that emerged from the transcripts was the facilitating effects of teammates and other divers, which encompasses four lower order themes: good company, encouragement, healthy competition and emotional support. Participants mentioned that teammates offered good company, which made diving a more enjoyable experience, 'I grew up diving with one of my best mates, me and (my friend) are still so close now, so that helped me so much'. Another area that was mentioned frequently was healthy competition. All three participants mentioned that their teammates diving progression inspired and furthered their own diving progression. When discussing the relationship he shared with his teammates, Tony recalled 'There's a competition inside you, you want to not loose even though it's not a competition, just you can't loose that little fight'. Another participant mentioned that once the friendly competition element of their training environment had gone it was more difficult to try new dives, 'I am very competitive driven, even if it just means doing the dive better or first, once that went the motivation for doing new things dropped off'. The participants also mentioned how team mates offer encouragement and social support, yet the wide age range of diving teams sometimes made this harder, Kathryn recalled 'When all the new generation came through they were all so young and having someone your own age makes it so much better, it's hard when you are the oldest'.

5.3.2.3. Good coaching. Another facilitator mentioned by all three participants was the positive effect of their coaching staff on their diving development and the management of their mental block. Four lower order themes were combined to create the higher order theme of good coaching: coach's experiences as a diver, trust, expert

knowledge and emotional support. One participant highlighted that their confidence in their coach came from the coach's experiences as a diver, the participant felt this meant the coach understood the process and emotions behind diving and mental block, 'I knew he had been there, he had done diving, he understood how I felt and how I worked'. Another participant mentioned that trust played a large role in the relationships formed with a coach, 'some coaches have got a massive amount out of me and I have masses of respect for them ... I would trust whatever he said and it worked every time'. Others also mentioned the emotional and social support offered by their coaching staff that helped with their progression, Martin recalled 'there were lots of occasions that they would be really supportive and positive and that was the reason I would go for a dive was through their motivation'.

5.3.2.4. Learned skills. All three participants mentioned several different learned skills and taught psychological interventions they relied upon during their competitive diving career. Four lower order themes were combined to develop the higher order theme of learned skills: visualisation, modelling, self-talk and adapting equipment. Visualisation is the process where an athlete is encouraged to imagine themselves completing the skills or exercise perfectly and aim to use all their senses to create an immersive experience. Visualisation is used in diving and one participant mentioned that learning visualisation was the turning point in their diving,

'Being taught how to do visualisation was really good. It meant I could prep it throughout the day, everyday of the week, and think about how it should be done so that when I came to do it all, I was thinking about the right way to do it as appose to the wrong way'.

Another learned skill mentioned was modelling. Modelling refers to the practise of an athlete watching others to gain experience and confidence in their own ability. Participants mentioned that modelling played an intrinsic part in their diving development. Some participants mentioned modelling elite and famous divers. Kathryn mentioned 'When we used to go and complete in Leeds and see some of the top athletes, like Rebecca Gallentree, I would just watch them train ... that definitely inspired me so much' and Tony mentioned 'Pete Waterfield really inspired me, Leon Taylor did'. Yet other participants mentioned that modelling athletes their own level helped them to develop, Martin recalled '(divers) in the group I was diving against a lot of the time, being mid to lower half of the table makes you want to be better. You are

constantly seeing them and they are advancing a lot'. Some participants mentioned the use of self-talk as a way of overcoming their mental block in relation to dives, 'I start swearing at myself, and swear a lot and remind myself its only pain'. Other mentioned how they would adapt their training environment or equipment to allow them to progress, 'I just went up on 1 metre and did it because it was just too hard on poolside', by using a higher board the participant managed to complete a skill they previously had not managed to successfully perform.

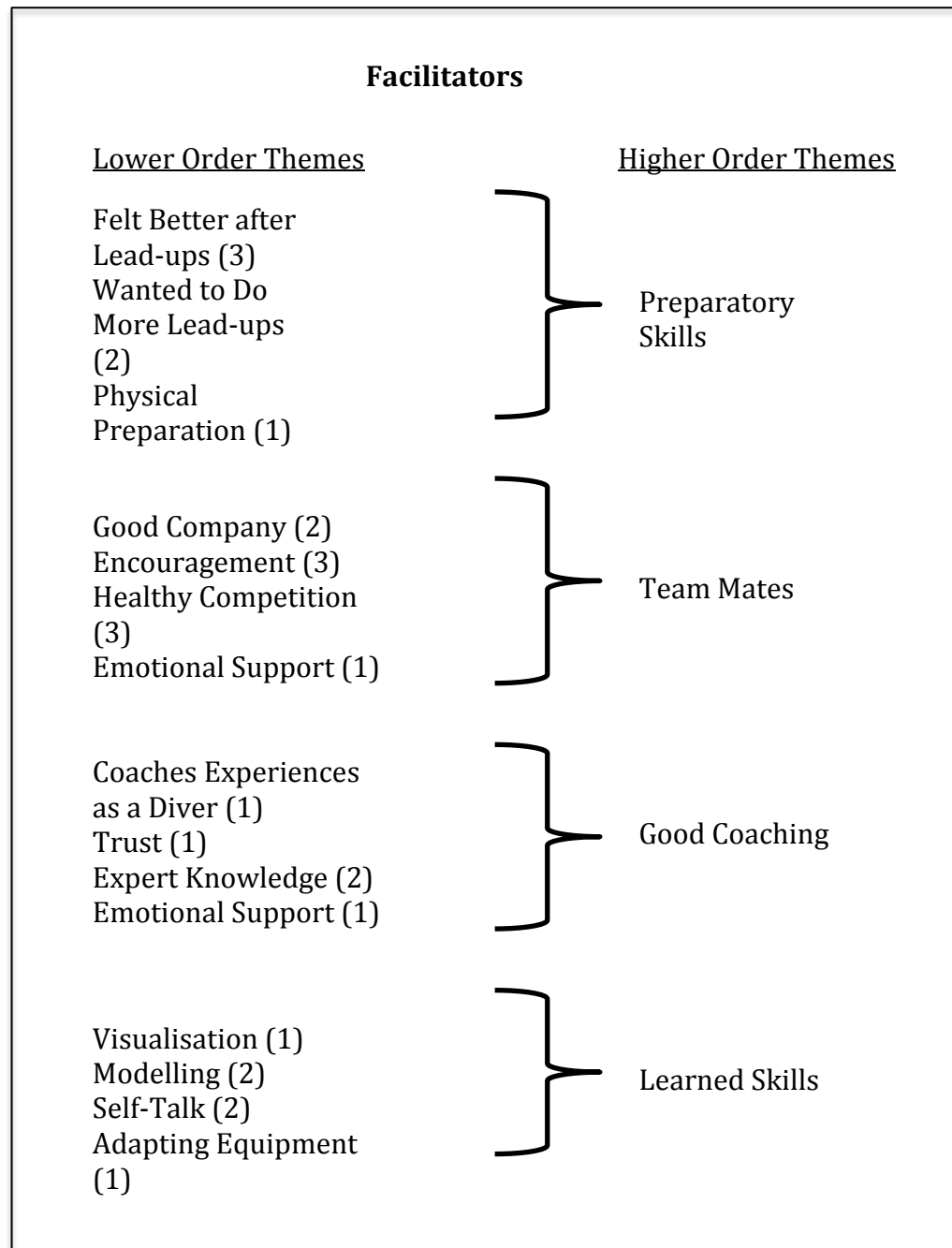


Figure 7: Facilitators to overcoming mental block in diving.

5.4. Discussion

The current study aimed to contribute to the current knowledge of psychological effects on diving performance by investigating the barriers and facilitators to overcoming mental block in diving. Four main barriers and four main facilitators emerged from the transcripts of detailed interviews with three former elite divers. The identification of existing barriers and facilitators to overcoming mental block in diving supports the assertion that mental block is present in diving, which further ratifies the existing literature in the field (Brunner, 2016; Huber 2016; Pattinson, Cotterill & Leyland, 2017). The current study also reinforced the assertion that mental block could be a cause of sports drop out (Enoksen, 2011; Heydari et al., 2014). Participants in the current study mentioned emotions such as frustration and fear at great length, which have been linked to mental block (Bennett et al., 2016). The apparent link between mental block and drop out was seen clearly when one participant in the current study mentioned leaving the sport as a method of overcoming their emotions caused by mental block.

The current study also supports the proposed causes of mental block posited by existing research (Bennett et al., 2016; Day et al, 2006; Lawrence, 2016). The barriers to overcoming mental block highlighted in the current study were emotions, loss of control, poor coaching and physical sensations. Existing research by Day et al. (2006) posited emotions and coach pressure as some of the main causes of mental block in sport, which link closely with the themes of emotions and poor coaching highlighted in the current study. Another study by Lawrence (2016) proposed a mind and body dichotomy could be a major cause of mental block, the theme of loss of control highlighted in the current study is similar to a mind and body dichotomy. Participants mentioned conflictions between their emotions and their physical reactions, which further support Lawrence's (2016) findings. Physical sensations were also suggested as a potential cause of mental block by Bennett et al. (2016), which was further reinforced by the findings of the current study.

The themes highlighted in the current study also suggest a link to Bandura's (1977) self-efficacy theory. Parallels can be drawn between the use of preparatory skills and gaining self -efficacy thought mastery experience. The facilitators of team mates and good coaching, along with the barrier of poor coaching can all be associated with

the self-efficacy factor of social persuasion. Finally the barriers of loss of control, emotions and physical sensations are all very similar to the influences of emotional states and physiological states described in self-efficacy research (Feltz, Short & Sullivan, 2008). The current study provides further support for the use of self-efficacy within a diving context. In addition, the description of cognitive skills such as visualisation and self-talk being used to mediate fear and anxiety, further identifies the potential for self-efficacy to be used as a mediator to diving related stress (Cascio et al., 2014; Yu et al., 2015).

The current study has taken an initial glance into the potential psychological impacts of springboard and highboard diving on the athlete, and offered up potential barriers and facilitators to diving performance and skill acquisition, which warrant further investigation. Despite the study using a sound methodology, the small, niche participant sample makes generalisation of the results difficult. Yet despite this minor limitation of the current study, the results offer a new angle for potential research in diving psychology. The use of cognitive skills such as visualisation and self-talk appears to be in its infancy within a diving context; further research should aim to enhance the use of these self-efficacy based interventions for possible performance enhancement and wellbeing development. The current study has opened the door for further research to investigate the barriers and facilitators to diving performance and the overcoming of mental block in differing ages and ability levels.

5.5. Conclusion

The current study highlighted the perceived effects of mental block, as well as the different barriers and facilitators to overcoming mental block in diving. The themes highlighted within the current study draw close parallels with the sources of self-efficacy (Bandura, 1977), which provides further support for the findings of study one positing the influence of the sources of self-efficacy on divers perceptions of their ability. The findings of both study one and study two provide a base of knowledge and context on which further research can develop. Further research should aim to address how self-efficacy affects divers ability and ultimately diving performance, and if the sources of self-efficacy follow the same hierarchy in diving as proposed by Bandura (1977). However, before it is possible to engage in quantitative enquiry there is a need for a suitable and valid measure of self-efficacy in a diving specific environment.

6.1. Aim

The aim of study three was to develop and validate a diving specific self-efficacy scale to further the quality and ecological validity of quantitative research in diving and the use of self-efficacy in applied practice. The findings from studies one and two highlighted the influence of self-efficacy on performance in diving using a qualitative methodology. However, in order to further enhance the understanding of self-efficacy and the way in which self-efficacy is used and interpreted within diving, an appropriate quantitative measure is necessary. Bandura (2006) suggested the need for situational specific self-efficacy scales to ensure the more robust results, raising the notion that a diving specific self-efficacy scale assist in ensuring further quantitative research is reliable.

As no diving specific self-efficacy scale currently exists, the current study aimed to develop a robust, reliable scale to further research in the area of self-efficacy in diving. The current study built upon the themes that emerged in a recent qualitative exploration of self-efficacy in diving (Pattinson, Cotterill & Leyland, 2017). The findings of studies one and two along with the broader existing literature relating to self-efficacy and sports performance informed item development for a new self-efficacy scale for a diving environment, which was followed by qualitative validity and reliability testing of the items developed. Existing literature on scale development was used to design, test and implement a new situational specific self-efficacy measure (Llewellyn et al., 2008; Zelenak, 2010). The online platform, SurveyMonkey, was used to present the measures to participants. To establish overall validity and reliability the DIVE-SE was put through a battery of tests. The analysis focused on the construct validity and convergent validity of the DIVE-SE.

6.2. Method**6.2.1. Design.**

The current study employed a mixed methods design from a pragmatic philosophical perspective. The initial stages of item development were informed by

existing qualitative research (Pattinson, Cotterill & Leyland, 2017) and validity was ensured with the use of member checking. Later stages of the scale development used a quantitative methodology and statistical analysis. The scale development methodology used within the current study was modelled on existing studies in self-efficacy scale development in sport (Llwelllyn et al., 2008).

6.2.2. Participants and Sampling.

Following the ethical approval of the DIVE-SE by the University's ethics board (see appendix J), an invitation to participate in the validity testing of the DIVE-SE was sent out to clubs and governing bodies across the international diving community. Firstly, governing bodies for the sport of diving in eight countries (UK, USA, Canada, Italy, Australia, New Zealand, South Africa and Ireland) were contacted and invited to disseminate information about the study to clubs in their country. Secondly, clubs were contacted directly via email in the UK (N=39), USA (N=18), Europe (N=5) and Canada (N=3) and invited to pass the information on to their divers. Thirdly, several high profile divers and members of the diving community in the UK and abroad promoted the research to their contacts globally. Finally, social media platforms such as Twitter, Facebook and LinkedIn were used to promote the research project to diving communities across the world.

Participants (N=178) from 16 countries completed the DIVE-SE. The sample size was slightly smaller than most similar studies in scale development, in which participant size ranged from 130 to 860 participants (Dennis & Faux, 1999; Llwelllyn et al., 2008; Murphy, Coover & Owen, 1989; Ryckman et al., 1982). However, as diving is a niche sport a smaller sample size was anticipated. The large majority of the participants came from the UK (N=114) with 36% of the participants drawn from outside the UK (See Table 4 below for a details on response rate by country).

Table 4 – Response Rate by Country

Country	Number	% of Total Participants
Australia	4	2.2%
Canada	8	4.5%
China	1	0.6%
Columbia	1	0.6%
France	1	0.6%
Hungary	1	0.6%
Ireland	1	0.6%
Italy	2	1.1%
Netherlands	1	0.6%
New Zealand	2	1.1%
Russian Federation	1	0.6%
Singapore	2	1.1%
South Africa	1	0.6%
Sweden	12	6.7%
UK	114	63.7%
USA	26	14.5%

To ensure a suitable sample size was achieved power and margin of error calculations were conducted. A margin of error formula was used along with the mean and standard deviation achieved in the current sample to calculate margin of error percentage. The formula involved multiplying the confidence level ($Z_{\alpha/2}$) by the standard deviation (σ) divided by the square root of the expected sample size (n) (see figure 8) (Calder, 1953).

$$Z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

Figure 8. Formula used to calculate margin of error

Using this formula a sample size as small as 120 participants would have achieved an acceptable margin of error percentage of 3% or less (Barlett, Kotrlik &

Higgins, 2001; Krejcie & Morgan, 1970). The current sample size of 178 participants achieved a suitable margin of error percentage of 2.5% (see table 5 for details)

Table 5 – Sample Size Power Calculations

Confidence Level	Sample Size (N)	Margin of Error	Margin of Error %
95%	50	108	4.7%
95%	100	76.3	3.3%
95%	120	70	3%
95%	150	62.3	2.7%
95%	178	57.2	2.5%
95%	200	54	2.3%

Participants' gender was distributed normally, 49% male (N=87) and 51% female (N = 91). However experience level was wide spread, with a minimum experience level of 1 year to a maximum of 51 years (M = 10 years, SD = 10.5 years). Age ranged from 12 to 75 years old (M = 31 years, SD = 17 years), one third of the participants were under the age of 18 years (N=60).

6.2.3. Measures.

6.2.3.1. DIVE-SE

The DIVE-SE was developed to measure overall diving self-efficacy and the five sources of self-efficacy: mastery experience, vicarious experience, social persuasion, physiological states and emotional states (Bandura, 1977; Feltz, Short & Sullivan, 2008) within a diving context. The scale was developed using Bandura's (2006) guidelines, which outline a framework for item development, content and validity analysis and a suitable response scale. Thirty two items were initially developed using a variety of sources including, existing self-efficacy scales; the Music Performance Self-Efficacy Scale (Zelenak, 2010), the Source of Sports Confidence Scale (Vealey et al., 1998) and the Climbing Self-Efficacy Scale (Llwellyn et al., 2008), as well as existing qualitative research into self-efficacy in diving (Pattinson, Cotterill & Leyland, 2017). Thirty items were adapted from existing scales to be relevant for a diving context and accessible for an adolescent participant sample. Two items were unique to the DIVE-SE to account for

specific aspects of diving self-efficacy, which were not covered by any existing scale. The draft scale was presented to a panel of four diving coaches to establish content validity and appropriateness for the diving community. Revised items were then sent to an expert panel of two academic scholars in the field of self-efficacy research for review, as it was felt the panel would have sufficient knowledge to comment on the relevance of the items in relation to self-efficacy theory (Kitchings et al., 2011). One additional item was added following recommendations from academic scholars.

Following academic and expert review the draft scale consisted of 33 items covering six subscales. The first subscale was designed as a measure of overall self-efficacy, which could be used in conjunction with the rest of the scale or in isolation as a shorter measure; the subscale consisted of eleven items (items 1-11). The second half of the DIVE-SE was designed to measure the five sources of self-efficacy, and consisted of the other five subscales; the mastery experience subscale contained 5 items (items 12, 16, 20, 24, 28), the vicarious experience subscale contained 5 items (items 13, 17, 21, 25, 29), the social persuasion subscale contained 6 items (items 14, 18, 22, 26, 30, 32), the emotional states subscale contained 4 items (items 15, 23, 27, 33) and the physiological states subscale contained 2 items (items 19, 31).

Participants were invited to respond to each question with a rating of 0 – 100 in a box following each item. Taking into account the current scale development literature a 0 – 100 continuous scale was used so as not to limit the participants' responses to units of 10, but to allow any numerical value between 0 and 100, which would potentially increase variance between items and participants (Pajares, Hartley & Valiante, 2001; Usher & Pajares, 2009; Zelenak, 2010). The DIVE-SE was split into the overall self-efficacy subscale and the five subscales covering the sources of self-efficacy for aesthetic reasons, but also to allow for easier reading and a simple way of offering only the overall scale if the future research being conducted did not require the complete detailed scale.

6.2.3.2. The revised competitive state anxiety inventory – 2 (CSAI-R2)

The first measure used to validity test the DIVE-SE scale is the CSAI-2. The CSAI-2 was initially developed by Martens et al. (1990) then later revised by Cox, Martens and Russell (2003), the revised version was used for the current study. The CSAI-R2 consists of seventeen items intended to measure three aspects of competitive anxiety: self-confidence, somatic anxiety and cognitive anxiety. The CSAI-R2 had respectably high

internal consistency coefficients for all three subscales (self-confidence $\alpha = .91$, somatic anxiety $\alpha = .88$, cognitive anxiety $\alpha = .83$).

Also, confirmatory factor analysis showed that all items loaded on only one subscale. One notable point is the CSAI-R2 elected to use a 4-point Likert scale instead of a 0 – 100 scale, which reduces the amount of variance available between items and between participants.

6.2.3.3. The Physical Activity Appraisal Inventory (PAAI).

The second measure used to validity test the DIVE-SE scale is the PAAI. The PAAI was developed by Haas and Northram (2010) for use within a medical and health setting, but the general nature of the scale allows its use in other fields of physical activity research. The PAAI contains thirteen items designed to assess attitudes and motivations toward physical activity. The PAAI follows Bandura's (2006) recommendations and uses a 0 – 100 scale with 10 unit intervals. The PAAI also had a very high internal consistency coefficient ($\alpha = .95$) and used principal component analysis to identify that all items loaded on a single factor.

6.2.4. Procedure.

The current study used the online platform of SurveyMonkey™ to collect data for the validity and reliability testing related to the DIVE-SE scale. SurveyMonkey™ is an online survey hosting site that offers a cost effective way of delivering a questionnaire to a global sample. Despite the limit of 1000 responses SurveyMonkey™ was still seen as a more financially viable than downloadable software alternatives, such as EZ Survey™, for small scale research projects (Wright, 2005). Participants were presented with an initial screen explaining the study's aims and asking for consent and ascent (if the participant was under the age of 18 years parental consent was required to proceed). The second screen presented collected demographic information including: age, gender, country of residence, years of diving experience and diving competition level. Participants completed three scales in order: (a) DIVE-SE (see appendix A), (b) Revised Competitive State Anxiety Inventory – 2 (CSAI-R2) (Cox, Martens & Russell, 2003), and (c) Physical Activity Appraisal Inventory (PAAI) (Haas & Northram, 2010). The CSAI-R2 and PAAI were used as general measures of motivations, confidence and self-efficacy in a sporting setting; the scales were selected, as they were both robust valid measures. Both the CSAI-R2 and the PAAI had high internal consistency (CSAI-R2 $\alpha = .91$, PAAI $\alpha =$

.95) (Cox, Martens & Russell, 2003; Haas & Northam, 2010). The methodological approach of using existing general measures to validate a state specific measure was taken from Gaudreau and Blondin (2002). The whole battery took on average 30 minutes. The scales were presented in the same order for all participants; due to the restrictive nature of the online format available via SurveyMonkey™ counterbalancing the order was not possible.

6.2.5. Data analysis.

A number of statistical techniques were used to establish the validity and reliability of the DIVE-SE as a measure of self-efficacy in springboard and highboard divers. Principal component analysis was used to establish the loading of variance across the subscales, and multivariate analysis of variance (MANOVA) was used to determine the scales discriminant validity. The Cronbach's alpha coefficient was used to determine internal consistency and Pearson's correlation coefficient was used to determine the measures consistency with other general measures of self-efficacy. The current study elected to use the previously mentioned analysis model as it follows a similar design as many previous scale development studies (Haas & Northam, 2010; Llwellyn et al., 2008; Vealey, 1986)

6.3. Results

6.3.1. Data Characteristics.

6.3.1.1. Missing data

The DIVE-SE was completed by a total of 178 participants. The DIVE-SE was presented first in the battery of tests so all of the participants completed all of the questions, as participants were unable to access the next page of the testing without completing all questions. This feature was offered as part of the online survey provider; Survey Monkey™. Some participants did not complete the entire battery of tests. All of the participants in this study completed the DIVE-SE (N= 178) and the majority of participants completed the PAAI (N= 167) and the CSAI-R2 (N= 166). The scales were intentionally placed in this order to minimise missing data in the DIVE-SE, this decision was made based on research highlighting that longer questionnaires receive less responses (Rolstad, Adler & Ryden, 2011).

6.3.1.2. Outliers

No participant responses were highlighted as outliers. All responses fell within three standard deviations of the mean, based on Poisson's distribution (Wardlaw, 2000). Both readings for skew (-.253) and kurtosis (.460) fell within normal distribution values (Stevens, 1992).

6.3.2. Validity and Reliability Analysis.

6.3.2.1. Principal component analysis

The sample was deemed suitable for factor analysis as it satisfied the following pre-requisite tests: sample size, factorability, collinearity and sphericity (Gorsuch, 1983; Hutchenson & Sofroniou, 1999). The current data set satisfied Hatcher's (1994) subject to variable ratio (STV), suggesting that data should have five times more subjects than the number of variables. The data set included in the current study had 33 variables, which would suggest a sample size of 165 participants or over, so a sample size of 178 participants satisfied the STV ratio. The first step of the analysis was to establish the factorability of the 33 variables included in the DIVE-SE. All 33 of the DIVE-SE variables correlated with at least one other variable at a value greater than .3 allowing for the assumption of suitable factorability (Field, 2006). The Kaiser-Meyer-Olkin measure of sampling adequacy was above the suggested .5 (KMO = .809), which was deemed a suitable level of collinearity among variables (Kaiser 1974), and falls into the category of great (Hutchenson & Safroniou 1999). Finally, Bartlett's test of sphericity was significant, also suggesting the suitability of the data set for factor analysis, ($\chi^2(171) = 858.591, p < .001$).

Principal component analysis with varimax rotation was used, as it is a well-documented, robust approach to multivariate data extraction using in existing research (Abdi & Williams, 2010). The main aim of the analysis was to identify and compute the underlying factors of the DIVE-SE scale. Principle component analysis was completed on each subscale individually, to ensure each subscale could be used in isolation as well as part of the total scale. In analysis of the first subscale, which is designed as a measure of overall self-efficacy, eigenvalues highlighted one factor that explained 51% of the variance. Following further analysis three items were eliminated as they failed to achieve the minimum factor-loading criteria of .4 set forth in research by Stevens (1992). The use of a factor-loading of .4 or above was further supported by Hair et al. (1998) who determined factor-loading criteria based on sample size. The item 'Dive in

unfamiliar pools', 'Take sensible risks' and 'Push myself' were removed due to insufficient factor loading scores. Table six illustrates the factor-loading scores for the remaining items after the removal of the three unsuitable items.

Table 6: Factor loadings subscale one – overall self-efficacy

Scale Item	Factor Loading
Keep my concentration	.497
Control my fear	.607
Prepare my body for hard dives	.450
Dive well	.537
Avoid making mistakes	.562
Prepare my mind for hard dives	.641
Achieve what I set out to do	.598
Use correct diving technique	.451

Principal component analysis was run with the remaining eight items, one single factor explained 55% of the variance (see figure 9) with all items achieving at least a .4 factor loading score.

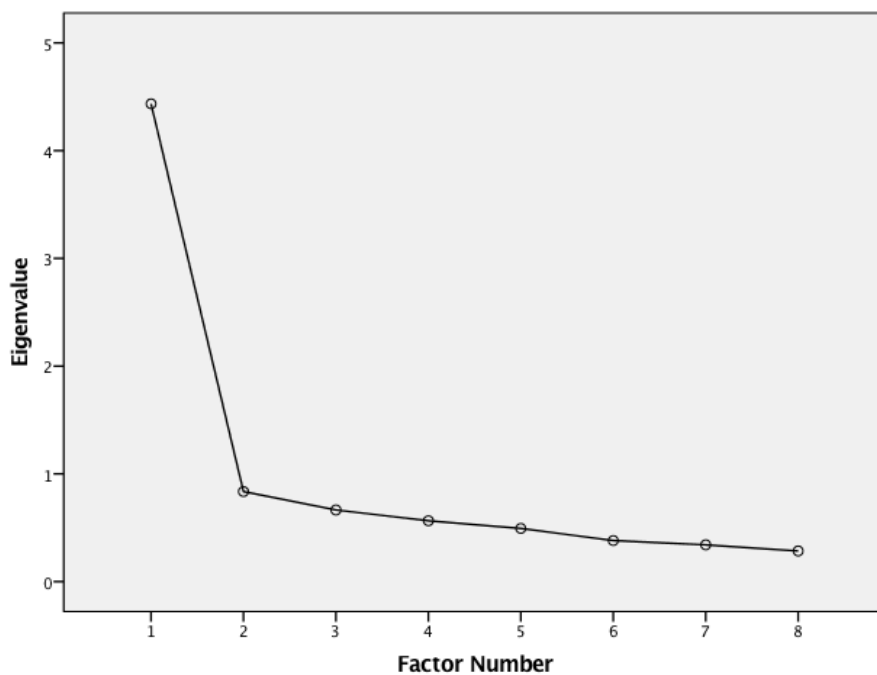


Figure 9: Eigenvalue scree plot subscale one – Overall self-efficacy

The same factor analysis approach was conducted on the second five-item subscale of mastery experience; eigenvalues highlighted two factors explaining 40% and 20% of the variance, respectively. All items had a primary factor loading of above .4, and all but one item has a cross-loading score of less than .3 (Stevens, 1992), meaning the primary factor explained the majority of the variance for that item. One item 'I have used a practice routine to help me prepare for diving' was eliminated due to a cross-loading score of .73 and a lower primary factor loading score of .45. Analysis was re-run with the remaining four items, one factor was identified that explained 47% of the total variance (see figure 10), and the remaining four items all had a suitable factor loading score.

Table 7: Factor loadings subscale two – mastery experience

Scale Item	Factor Loading
I have positive experiences from past diving sessions	.565
I have had positive experiences performing simple dives	.547
I have had positive experiences performing complicated dives	.570
I have overcome diving challenges through hard work and practise	.585

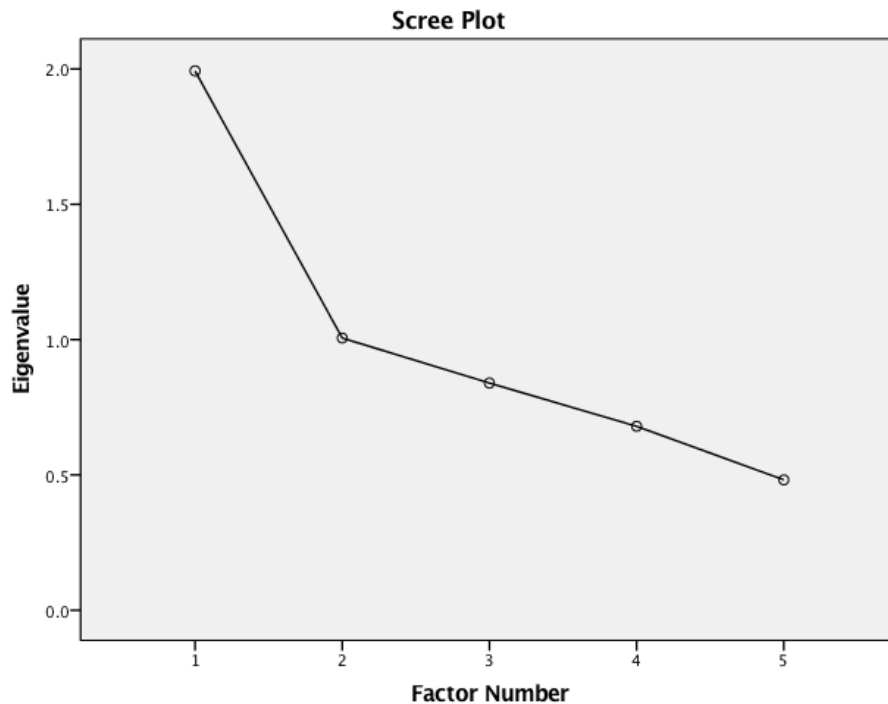


Figure 10: Eigenvalue scree plot subscale two – Mastery Experience

The third subscale contained five items developed to measure vicarious experience. Eigenvalues showed two factors that explained 43% and 20% of the variance, respectively. Three items showed a primary factor-loading score of .6 or more and a cross-loading score of .3 or below. One item 'I have compared my diving skills with those of other divers at my level' had a primary factor-loading score of only .35, so was removed. Another item 'I have watched other divers try a new dive and then decided if I could try the same dive' had a cross-loading score of .39, yet due to the high primary factor-loading score of .61 the item was retained. The analysis was re-run with the remaining four items, eigenvalues identified one factor that explained 51% of the variance (see figure 11), and all items achieved a factor loading score of .5 or more.

Table 8: Factor loadings subscale three – vicarious experience

Scale Item	Factor Loading
I have improved my diving skills by watching professional divers I admire perform well	.567
I have improved my diving skills by watching divers at my level perform well	.660
Observing my teammates helps me learn new dives	.601
I have watched other divers try a new dive then decided if I could try the same	.522

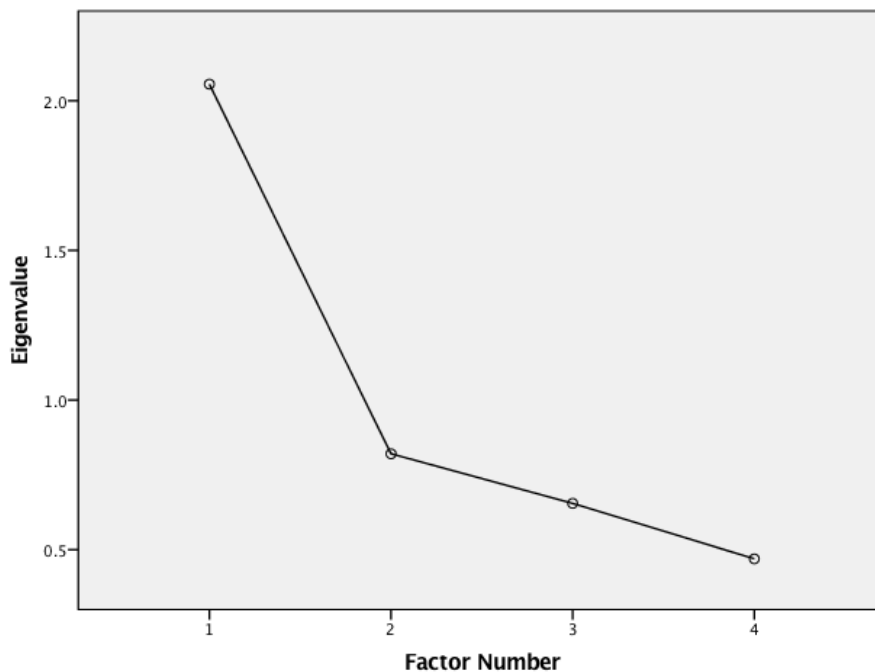


Fig 11: Eigenvalue scree plot subscale three – Vicarious Experience

The fourth subscale, designed to measure social persuasion contained six items. Eigenvalues highlighted one factor that explained 44% of the variance. However, three items had a factor-loading score of below .4. Analysis was re-run after the removal of one item, ‘People have told me that my practise efforts have improved my diving ‘, which had a factor loading score of .298. After the removal of one item, eigenvalues

highlighted one factor that explained 49% of the variance (see figure 12), and all but one item had a factor loading score of above .4. The item that had a factor loading score of .330, 'My coach has complimented me on my ability to dive ' was retained, as it was the only item to mention coaching influence on self-efficacy, which has been well documented in both diving and wider sports research as an influence on self-efficacy.

Table 9: Factor loadings subscale four – Social Persuasion

Scale Item	Factor Loading
My teammates think I am a good diver	.679
Members of my family believe I dive well	.534
My coach has complimented me on my ability to dive	.330
I have received positive feedback about my dives from divers outside my club	.435
I have met or exceeded other people's expectations for a diver of my age	.472

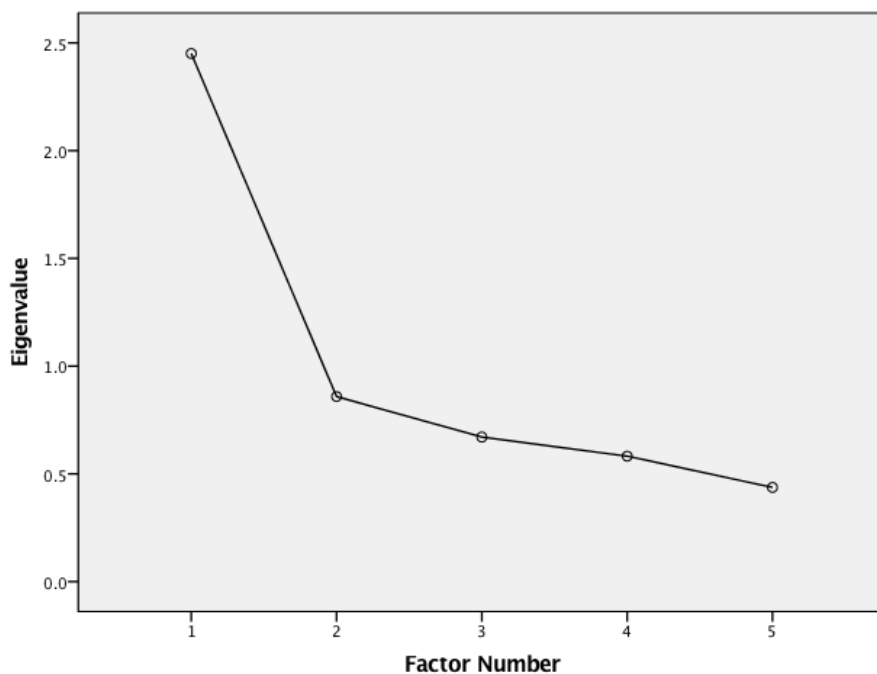


Figure 12: Eigenvalue scree plot subscale four – Social Persuasion

The fifth subscale contained two items and measured physiological states. Eigenvalues highlighted one factor that explained 52% of the variance (see figure 13) and both items had a factor-loading score of .5 or above.

Table 10: Factor loadings subscale five – Physiological States

Scale Item	Factor Loading
Diving makes me feel good	.524
I often feel like I can't move when preparing to dive	.524

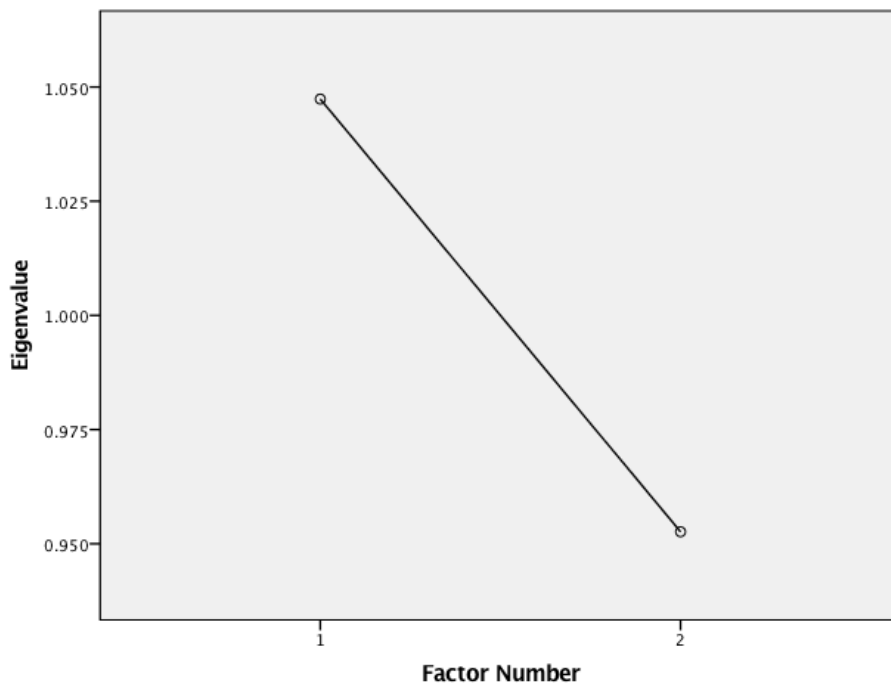


Figure 13: Eigenvalue scree plot subscale five – Physiological States

The sixth subscale contained four items and was designed to measure emotional states. Eigenvalues highlighted one factor that explained 40% of the variance, however only two items achieved over the .4 level of factor loading. After the removal of two items eigenvalues highlighted one factor explaining 68% of the variance (see figure 14) and the remaining two items had a suitable factor loading score of above .6.

Table 11: Factor loadings subscale five – Emotional States

Scale Item	Factor Loading
I do not worry about mistakes when diving	.688
Diving makes me feel upset	.688

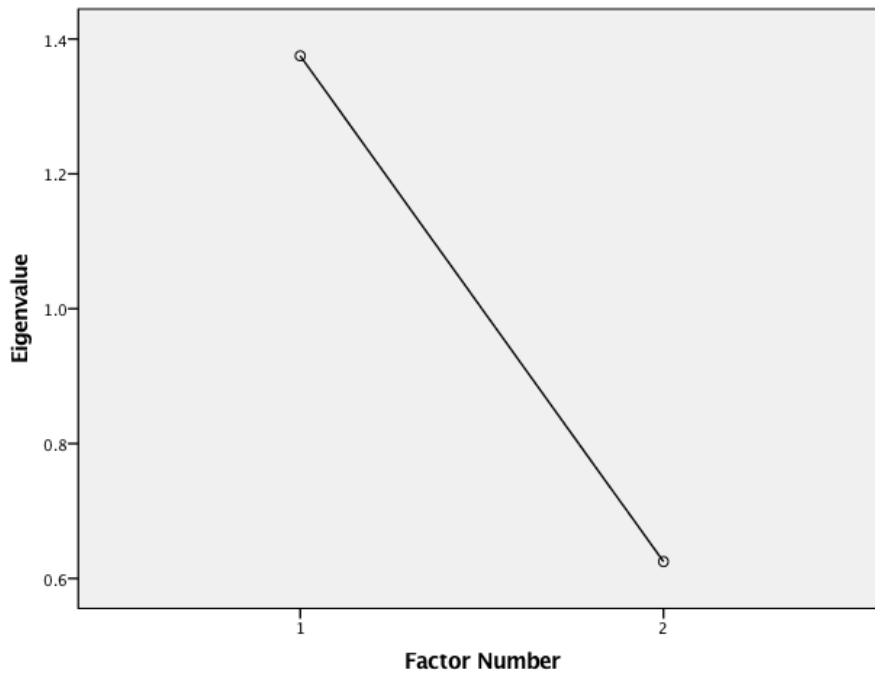


Figure 14: Eigenvalue scree plot subscale six – Emotional States

6.3.2.2. Internal reliability

Internal reliability is a measure of how each item of a scale correlates with other items and the total score (Steiner & Norman, 2003). To measure internal reliability the current study utilised the widely used statistical test Cronbach's alpha. Cronbach's alpha is a coefficient of reliability used to measure the internal reliability of psychological scales and questionnaires. A suitable Cronbach's alpha score should fall between .75 and .95 (DeVellis, 2003; Nunnally & Bernstein, 1994), however more recent research has suggested that a score above .90 could suggest the presence of redundant items (Tavakol & Dennick, 2011). Another test of internal reliability is a test re-test protocol, however this was not possible due to a low number of participants completing the test for a second time.

The first subscale that measured overall self-efficacy was analysed separately from the following five subscales measuring the sources of self-efficacy. Following the removal of three items during factor analysis the first subscale of the DIVE-SE contained eight items and presented with a high Cronbach's alpha score ($\alpha = .88$). The analysis was complete as all remaining items were contributing to the internal reliability and removal of any further items would reduce the Cronbach's alpha score.

The following five subscales were analysed as a measure of the sources of self-efficacy. The initial Cronbach's alpha score for the five sources subscales was acceptable ($\alpha = .81$). However following the removal of one item from the physiological states subscale, the internal reliability was improved ($\alpha = .82$). Due to the low number of items in the physiological states and emotional states subscales, they were combined into a single sub-scale for further analysis. The whole 24-item DIVE-SE scale achieved a suitably high Cronbach's alpha coefficient ($\alpha = .89$), which suggested the measure had internal consistency.

6.3.2.3. Convergent Validity

Pearson's correlation coefficient was used to measure the suitability of the DIVE-SE as a measure of self-efficacy within a sporting context when compared to the PAAI and CSAI-R2. Moderate correlations with the PAAI ($r(165) = .277, p < .001$) and the CSAI-R2 ($r(164) = -.298, p < .001$) presented satisfactory convergent validity with existing general scales. A higher correlation was not expected due to the specific nature of the DIVE-SE scale and the general nature of the PAAI and CSAI-R2.

6.3.2.4. Discriminant validity

A multivariate analysis of covariance (MANCOVA) was used to determine the discriminant validity of the DIVE-SE. Discriminant validity refers to a scale's ability to distinguish between different groups of participants, in the case of the DIVE-SE scale between lower and higher ability divers.

Before conducting a MANCOVA analysis the data must satisfy nine assumptions. The data satisfied assumption one, as two or more of the dependant variables are measured using an interval or ratio level. The second assumption was satisfied as the independent variable is split into two categorical groups. There was independence of

observations as no participant was included in both groups satisfying the third assumption. The sample size was sufficient as there were more participants in each group than the number of dependant variables being analysed, satisfying assumption four. No participant responses were highlighted as outliers. All responses fell within three standard deviations of the mean (Wardlaw, 2000), satisfying assumption five. Assumption six relates to multivariate normality or the normal distribution of data, overall self-efficacy scores were normally distributed, with a non-significant Shaprio-Wilk score for both ability level (low ability $p = .346$, high ability $p = .072$) and gender (male $p = .677$, female $p = .132$). However, all four variables of mastery experience, vicarious experience, social persuasion and physiological/emotional states had a significant Shaprio-Wilk score, suggesting a lack of normal distribution. All four dependant variables had very similar scores on the Shaprio-Wilk test: Mastery experience ($p < .001$), vicarious experience ($p = .001$), social persuasion ($p < .001$) and physiological/emotional states ($p < .001$). All four variables were very similarly distributed with a slight positive skew towards higher scores. As all dependant variables had a similar positive skew the analysis still conducted. A linear relationship between dependant variables and each group of the independent variable was present satisfying assumption seven. The Box's M test of equality of covariance was not significant ($p = .59$) satisfying assumption eight. Finally, correlation between variables was below .9 demonstrating no multicollinearity, which satisfied assumption nine.

The results of the MANCOVA indicated the scores on the DIVE-SE scale were significantly different between higher and lower ability divers. The average self-efficacy scores of higher ability divers were significantly greater ($M = 73.22$, $SD = 11.99$) than lower ability divers ($M = 65.05$, $SD = 12.43$) ($F(1,175) = 14.36$, $p < .001$), supporting the assertion of suitable discriminant validity.

6.3.2.5. Percentiles

Using the same sample as the validity analysis, the current study has also presented a chart of average score percentiles for different levels of divers to allow for diagnostic use in future research. Overall self-efficacy score is an average score gained from section one of the DIVE-SE scale, the score can range from 0 – 800 points. The sources of self-efficacy scores are an average score gained from specific items on section two of the scale: Mastery experience (items 1, 5, 8, 12), vicarious experience (items 2, 6,

9, 13), social persuasion (items 3, 7, 10, 14, 16) and physiological/emotional states (items 4, 11, 15). Items 11 and 15 are reverse scored. Section two of the DIVE-SE scale has a scoring range of 0 – 1,600 points. The scoring ranges for each sub-scale is: mastery experience 0 – 400 points, vicarious experience 0 – 400 points, social persuasion 0 – 500 points and physiological/emotional states 0 – 300 points.

Table 12: Percentiles for Scoring Self-Efficacy Levels using DIVE-SE Scale

	Diver level	Percentiles (%)						
		5th	10th	25th	50th	75th	90th	95th
Overall Self-Efficacy	Low	35.00	35.63	49.06	61.25	67.50	76.45	85.44
	High	46.49	49.81	58.75	70.94	79.22	88.61	92.66
Mastery Experience	Low	55.63	63.00	70.00	80.00	93.13	99.30	100.00
	High	63.56	65.00	73.75	83.75	93.75	99.83	100.00
Vicarious Experience	Low	38.00	40.20	50.00	61.00	66.50	75.80	79.70
	High	27.57	35.70	47.00	56.00	66.80	78.00	80.00
Social Persuasion	Low	20.98	26.48	47.80	59.20	75.00	83.60	94.50
	High	47.53	53.40	66.00	76.50	89.75	96.00	98.81
Physiological/Emotional States	Low	20.03	24.27	40.00	63.33	78.17	88.13	96.40
	High	39.50	46.67	60.00	73.33	86.25	93.73	99.05

Scores reported are the percentage of scores on each sub-section

6.4. Discussion

The aim of the current study was to develop a valid and reliable scale for the measurement of self-efficacy within a diving context. The potential performance enhancement and protective nature of self-efficacy (Cascio et al., 2014; Corrado et al., 2015) made self-efficacy a suitable theoretical framework for further investigation and applied interventions within diving. In addition, existing qualitative research had suggested the use of self-efficacy in diving and the potential effects of certain stimuli on diving performance. The current literature posits that a state specific self-efficacy scale can provide more robust results than a general self-efficacy scale (Bandura, 2006). As no

state specific scale currently existed within springboard and highboard diving, the current study aimed to address this gap in the literature.

The DIVE-SE scale uses a continuous 0 – 100 rating scale, however Bandura (2006) suggests the use of a 0 – 100 incremental scale with increments of 10. Research has demonstrated that using a 0 – 100 continuous scale allows for more variance between participants, meaning a more accurate measurement (Pajares, Hartley & Valiante, 2001; Usher & Pajares, 2009). A 0 – 100 continuous scale has been used in similar state specific self-efficacy measures with success (Zelenak, 2010).

Principal component factor analysis was used to determine if the DIVE-SE was a suitable fit to Bandura's (1977) model of self-efficacy theory. Each subscale was analysed independently to ensure a fit to the overall model. The removal of four items across three subscales improved the model fit, and provided a more succinct and shorter scale. Demonstrating a suitable fit of self-efficacy theory to diving performance highlights that self-efficacy theory can be applied to a diving context, which opens up the field for further investigation.

The validity analysis involved in the current study also demonstrated the DIVE-SE's ability to distinguish higher-level divers from lower-level divers. The scales ability to distinguish between different levels of divers further supports the question raised in the literature of the impact of self-efficacy on diving ability (Feltz et al., 2008; Slobounov et al., 1997). Demonstrating the DIVE-SE scale's ability to distinguish diving levels within this sample opens up the potential for research into the effects of self-efficacy on performance success. The results of the tests of convergent validity show the scale has a suitable fit with existing measure. The moderate strength of the correlation shows the DIVE-SE is measuring self-efficacy, a higher correlation was not expected as the PAAI and CSAI-R2 are general scales and the DIVE-SE is a state specific scale. The DIVE-SE also demonstrated a strong measure of internal consistency. The removal of three items from three different subscales increased the Cronbach's alpha score to a suitably high level to assert strong internal consistency. The strength of the scales internal consistency acknowledges the measure has suitable variance across sub-scales, yet all sub-scales are contributing to the same overall model.

The current study has opened up the possibility of further research into self-efficacy within diving by providing a suitable state specific scale. Despite the encouraging findings of the current study, interpretation and generalisation should be approached with caution. The data collected had a large amount of variance in level of diver, age and location of training, which has given a strong overview of the diving population. In addition, due to certain language and accessibility constraints certain influential groups within the global diving community were not accurately represented. For example, China is the strongest diving nation in the world to date (FINA, 2017b) yet the current sample only included one diver representing China. This lack of representation could be addressed by offering a translated version of the DIVE-SE scale (Choi & Pak, 2005; Moradi, Sidorchuk & Hallqvist, 2010), however the process of translation presents many fiscal and methodological issues (McKay et al., 1996). Moreover, before the scale can be used in a more specific diving context validity testing should be replicated to ensure the suitability of the measure for more targeted diving populations. Due to the large spread of the age of the participants it is unclear at the current juncture if the measure is suitable for younger children and adolescents, further testing may be necessary to ensure a suitable fit to a younger sample.

The main aim of the current study was to develop a measure that could be applied to further quantitative research into the impacts and uses of self-efficacy within the sport of diving. The current study was undertaken using a varied sample of divers of all levels from across the world. Recommendations for future research would include testing the validity of the scale with more specific diving samples, which should include adolescents and younger divers. Further research could also investigate any potential links between diving performance and self-efficacy ratings. The potential investigation of the hierarchy of influences on self-efficacy in diving also warrants attention. Research suggests that the model set forth by Bandura (1977) that places mastery experience as the most influential source of self-efficacy is not true for all environments (Feltz & Mungo, 1983; Samson, 2014). Research to investigate how the sources of self-efficacy influence self-efficacy development in divers could inform the development of interventions to improve self-efficacy in the diving community.

6.5. Conclusion

The DIVE-SE scale as presented in this study demonstrates satisfactory validity and reliability, and as such can be used as a measure of self-efficacy for future research in diving. The existence of a suitable self-efficacy measure for diving specific environments allows for further research to use a quantitative methodology. Further research should aim to investigate and confirm the results seen in the existing qualitative findings of studies one and two. Studies one and two highlighted the possibility that the sources of self-efficacy may have a different hierarchy of importance than the order stated by Bandura (1977). Using the DIVE-SE scale researchers can investigate previous findings using a robust statistical approach. Further knowledge of the interaction of the different sources of self-efficacy will inform the development of self-efficacy enhancing interventions. Moving forwards, the next set of studies can now use a quantitative methodology now that a suitable measure of diving specific self-efficacy has been developed. However, the next study will need to discover if self-efficacy is linked with diving ability level before any self-efficacy enhancing interventions can be designed.

7.1. Aim

The current study aimed to investigate the links between diving ability and self-efficacy, along with the hierarchy of the sources of self-efficacy within a representative diving sample. Previous research in studies one and two highlighted the possibility that different sources of self-efficacy may affect divers perceptions of their ability in different ways. Bandura (1977) posited that mastery experience is the most important influence on self-efficacy, followed by vicarious experience, social persuasion and finally physiological and affective states, later split into physiological states and emotional states (Feltz, Short & Sullivan, 2008). In contrast, the findings of studies one and two demonstrated the potential importance of physiological states and emotional states within a diving environment, suggesting Bandura's (1977) hierarchy may not be accurate within a diving environment. The current study aimed to provide quantitative support for the findings of study one and two, along with providing an accurate hierarchy of the sources of self-efficacy within a diving environment.

The current study aims to provide answers to the following hypotheses. Firstly, does the hierarchy of the sources of self-efficacy with a diving sample differ to the hierarchy presented as in the model presented by Bandura (1977). Considering the findings of studies one and two it was expected that social persuasion, physiological states and emotional states could be more influential than mastery experience and vicarious experience. Existing literature in other sports also supports the notion that the hierarchy of the sources of self-efficacy may differ in different sporting environments (Machida, Ward & Vealey, 2012; Valiante & Morris, 2013). Secondly, is there a link between diving ability level and self-efficacy? Based on existing research in other sport (Gomez-Paloma, Rio & D'anna, 2014; Nam-Young, Jae-Hyeon & Ho, 2015; Llewellyn et al., 2008) it is expected that higher ability divers will have greater levels of self-efficacy than their lower ability counterparts. Before any research can be conducted to aimed to enhance performance through self-efficacy, further understanding is necessary of the relationship between self-efficacy and sports ability.

7.2. Method

7.2.1. Design.

The current study utilised a quasi-experimental design, to analyse the relationship between the independent variables of diving ability and gender, and the dependant variables of mastery experience, vicarious experience, social persuasion and physiological/emotional states. The study offered a cross-sectional quantitative insight into an international diving community.

7.2.2. Participants and Sampling.

An opportunity sample of 176 competitive divers was recruited from 16 countries: Australia, Canada, China, Columbia, France, Hungary, Ireland, Italy, Netherlands, New Zealand, Russian Federation, Singapore, South Africa, Sweden, UK and USA. Initial contact was made with diving national governing bodies and individual clubs by email to invite participation, followed by promotion of the research via Twitter™ and Facebook™ by the research team as well as high profile diving celebrities, such as Olympians and world champions. Participants' ages ranged from 12 years to 75 years ($M = 31$ years, $SD = 17$ years). Participants reported a range of different ability levels. Ability level was measured based on the divers current competitive level. Eight different levels were offered: recreational, novice, skills, age groups, junior elite, senior elite, novice masters and full master. Recreational, novice, skills and novice masters are lower-level ability groups, and age groups, junior elite, seniors, and full masters are higher-level ability groups, based on the difficulty of dives performed. Within recreational, novice, skills and novice masters level diving it is rare for divers to perform dives above a 2.0-degree of difficulty (ASA East Region, 2016; FINA, 2017a), which restricts them to simple, lower level skills. Whereas in age groups, junior elite, seniors, and full masters divers perform more difficult skills with a much higher demand on degree of difficulty and variety of dives (British Diving, 2016; FINA, 2017a). Masters competitions are for divers over the age of 25 years. Novice, skills, age groups and junior elite level competitions are restricted to divers under the age of 18 years. Senior and recreational divers can be of any age. Participants' years of experience ranged from 1 year to 51 years ($M=10$ years, $SD = 10.5$ years).

7.2.3. Measures.

7.2.3.1. Self-efficacy measurement

The DIVE-SE scale was used to measure diving specific self-efficacy levels in the current study. The DIVE-SE scale is a 24-item measure specifically designed to measure overall self-efficacy and individual sources of self-efficacy in a diving context. The scale is split into two sections, the first section contains eight items and measures overall self-efficacy and the second section contains 16 items and measures the five sources of self-efficacy. During the validity and reliability testing of the measure several items were removed due to inconsistencies, to this end the sources of physiological states and emotional states are measured together using the same sub-scale.

7.2.4. Procedure.

Participants completed the DIVE-SE scale using the online platform SurveyMonkey™ to allow for easy online access to achieve an international sample (Gagner et al., 2013; Lowry et al., 2016; Schroter et al., 2016). SurveyMonkey™ also offered a low cost, user-friendly interface when compared to other online data collection platforms. Participants were made aware of the aims of the research study and asked to provide consent, in the case of participants under the age of 18 years a parent or guardian was required to give consent and the child participant gave assent. An initial page was presented that required the diver and parent for divers under the age of 18 years to tick a box to provide consent before the participant could progress to the next screen. Participants completed a demographic information form, which collected their age, gender, nationality and competitive level. Participants were then presented with the DIVE-SE scale in an online format. Following the completion of the DIVE-SE scale a final screen was presented offering a comment box for participants to voice any opinions or concerns; no participant chose to use this option.

7.2.5. Data Analysis.

A multiple analysis of variance (MANOVA) was used to determine the statistical difference between the four measured sources of self-efficacy. The dependant variables used were the average score for each participant on the four measured sources of self-efficacy: mastery experience, vicarious experience, social persuasion and physiological/emotional states. The independent variables used were ability level and gender.

7.3. Results

Before conducting a MANCOVA analysis the data must satisfy nine assumptions. The data satisfied assumption one, as two or more of the dependant variables are measured using an interval or ratio level. The second assumption was satisfied as the independent variable is split into two categorical groups. There was independence of observations as no participant was included in both groups satisfying the third assumption. The sample size was sufficient as there were more participants in each group than the number of dependant variables being analysed, satisfying assumption four. No participant responses were highlighted as outliers. All responses fell within three standard deviations of the mean (Wardlaw, 2000), satisfying assumption five. Assumption six relates to multivariate normality or the normal distribution of data, overall self-efficacy scores were normally distributed, with a non-significant Shaprio-Wilk score for both ability level (low ability $p = .346$, high ability $p = .072$) and gender (male $p = .677$, female $p = .132$). However, all four variables of mastery experience, vicarious experience, social persuasion and physiological/emotional states had a significant Shaprio-Wilk score, suggesting a lack of normal distribution. All four dependant variables had very similar scores on the Shapro-Wilk test: Mastery experience ($p < .001$), vicarious experience ($p = .001$), social persuasion ($p < .001$) and physiological/emotional states ($p < .001$). All four variables were very similarly distributed with a slight positive skew towards higher scores (see figure 15). As all dependant variables had a similar positive skew the analysis still conducted. A linear relationship between dependant variables and each group of the independent variable was present satisfying assumption seven. The Box's M test of equality of covariance was not significant ($p = .59$) satisfying assumption eight. Finally, correlation between variables was below .9 demonstrating no multicollinearity, which satisfied assumption nine. Participant age and years of diving experience were included as potential covariance but neither were significant so were excluded from analysis.

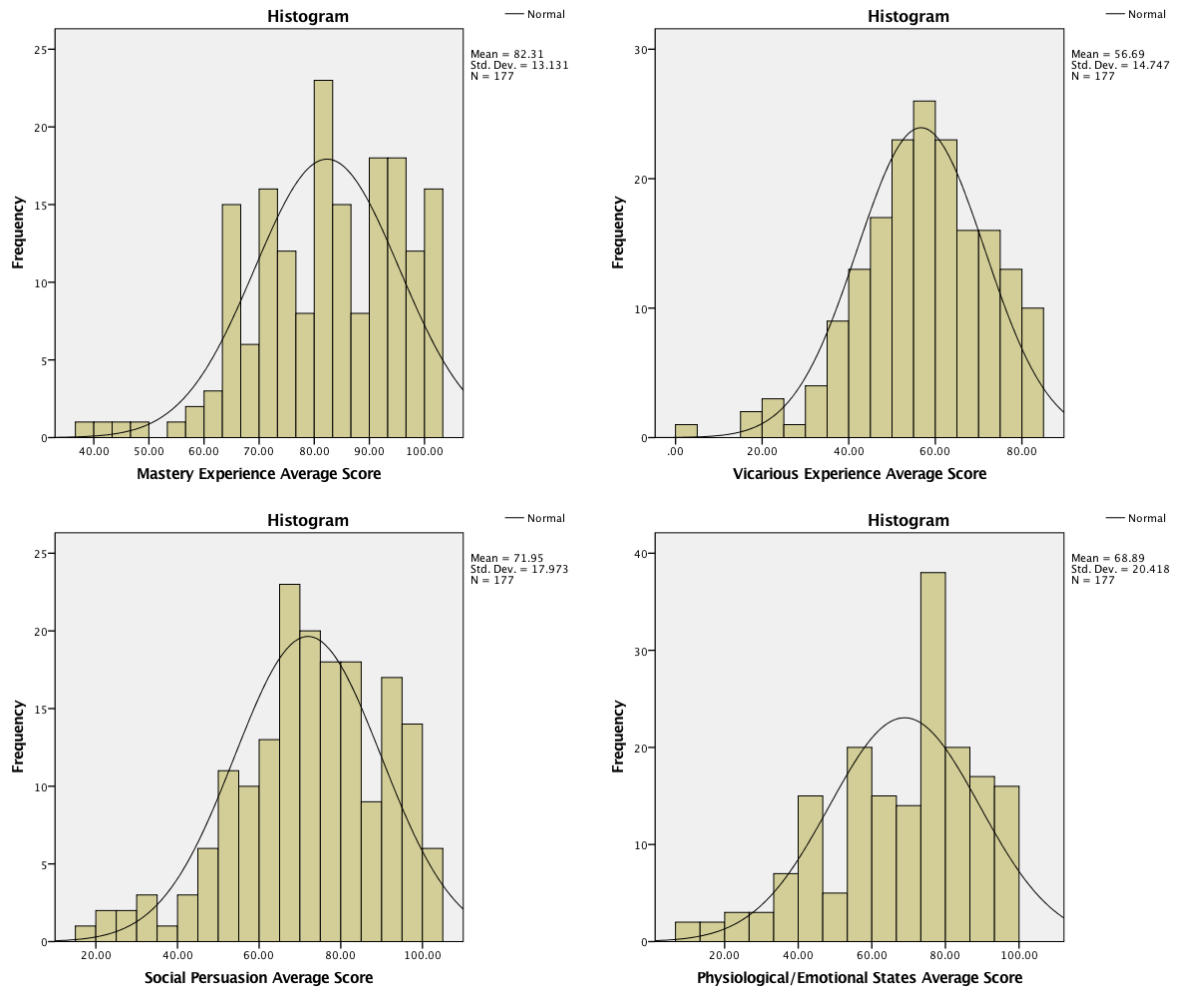


Figure 15: Distribution histograms for dependant variables

There was a significant difference between diving ability level and overall self-efficacy ($F(1,175) = 12.42, p = .001$). Higher ability divers ($M = 68.68, SD = 15.44$) had greater scores of overall self-efficacy than lower ability divers ($M = 59.06, SD = 14.87$). There was also a significant difference between diving ability level and gender ($F(1,175) = 4.27, p = .040$). Male divers had higher levels of overall self-efficacy ($M = 68.92, SD = 15.02$) than female divers ($M = 64.45, SD = 16.25$).

A significant positive difference was found between diving ability level and social persuasion ($F(1, 175) = 30.69, p < .001$), as well as ability level and physiological/emotional states ($F(1,175) = 12.41, p = .001$). The difference between diving ability level and vicarious experience was non-significant. The relationship between diving ability level and mastery experience was non-significant. High-level

divers had higher levels of social persuasion and physiological and emotional states self-efficacy beliefs than low-level divers (see table 13 for details).

There was also a significant effect of gender reported on mastery experience ($F(1,175) = 8.67, p = .004$) and physiological/emotional states ($F(1,175) = 15.64, p < .001$). Female divers ($M = 79.52, SD = 13.95$) had lower level of mastery experience self-efficacy beliefs than male divers ($M = 85.21, SD = 11.61$). Female divers ($M = 63.16, SD = 19.51$) also had significantly lower levels of physiological/emotional states self-efficacy beliefs than male divers ($M = 74.82, SD = 19.73$). There was no significant difference between gender and vicarious experience or social persuasion.

Table 13 – Means and standard deviations of the average score of each source of self-efficacy by ability level

	Mastery Experience	Social Persuasion	Physiological/Emotional States	Vicarious Experience
Recreational (N = 8)	M = 72.25 SD = 11.42	M = 52.56 SD = 15.50	M = 56.63 SD = 24.24	M = 53.67 SD = 13.18
Novice (N = 11)	M = 78.13 SD = 17.43	M = 52.22 SD = 27.18	M = 57.79 SD = 26.96	M = 56.69 SD = 16.20
Skills (N = 7)	M = 83.57 SD = 12.32	M = 71.49 SD = 14.96	M = 69.95 SD = 17.33	M = 59.86 SD = 16.20
Novice Masters (N = 11)	M = 85.29 SD = 10.02	M = 64.08 SD = 13.41	M = 56.87 SD = 23.39	M = 62.91 SD = 8.15
Low-Level Divers (N = 37)	M = 80.18 SD = 13.83	M = 59.34 SD = 20.25	M = 59.35 SD = 23.53	M = 58.48 SD = 12.11
Age Groups (N = 42)	M = 80.98 SD = 13.27	M = 74.49 SD = 13.58	M = 72.92 SD = 17.87	M = 56.50 SD = 16.78
Junior Elite (N = 13)	M = 83.73 SD = 11.78	M = 72.43 SD = 19.15	M = 68.90 SD = 19.73	M = 54.54 SD = 12.74
Seniors (N = 24)	M = 85.29 SD = 13.48	M = 79.17 SD = 17.11	M = 67.75 SD = 20.03	M = 61.46 SD = 13.96
Full Masters (N = 53)	M = 83.26 SD = 12.73	M = 75.99 SD = 15.11	M = 73.27 SD = 18.27	M = 54.01 SD = 15.01
High Level Divers (N = 132)	M = 82.96 SD = 12.90	M = 75.75 SD = 15.39	M = 71.77 SD = 18.53	M = 56.15 SD = 15.45
Whole Sample Average	M = 82.31 SD = 13.13	M = 71.95 SD = 17.97	M = 68.89 SD = 20.42	M = 56.69 SD = 14.75

7.4. Discussion

The current study aimed to identify the influence hierarchy of the sources of self-efficacy on divers, along with exploring any potential links between diving ability level and self-efficacy in diving. The findings of the current study supported current research in gymnastics (Gomez-Paloma, Rio & D'anna, 2014) and dance (Nam-Young, Jae-Hyeon & Ho, 2015), by identifying a significant positive difference between diving ability level and self-efficacy. The findings supported the premise that higher ability

divers had higher levels of self-efficacy than lower ability divers, suggesting a potential self-efficacy performance relationship in diving. However, when considering the sources of self-efficacy in relation to diving ability the current study highlighted that only the sources of social persuasion and physiological/emotional states appeared to affect diving ability in the current sample.

A gender difference was also found, results highlighted that female divers had significantly lower levels of self-efficacy than male divers, which also suggests a further variable to consider when moving forward with self-efficacy performance interventions. Very few studies in self-efficacy and diving considered a gender difference. One study that considered the effect of gender on diving found no gender difference in relation to self-efficacy (Feltz, 1988a). Moreover, research by Coyle, Gorczynski & Gibson (2017) highlighted difficulties with mental health and body image were prevalent in diving across both genders. The small amount of findings relating to gender highlights the findings of the current study as unexpected, however with such a small amount of research precedent it seems foolish to dismiss the findings of the current study as anomalous. Further research is definitely necessary to establish if there is a gender difference in relation to diving self-efficacy, and how a gender difference could potentially effect the development and delivery of self-efficacy based psychological interventions in diving.

The results of the current study identified an influence hierarchy for the sources of self-efficacy in diving. The findings of the current study suggested social persuasion was the most influential source of self-efficacy for the participants in the study, followed by physiological/emotion states, with mastery experience and vicarious experience showing a non-significant relationship with ability within a diving context. This hierarchy identified in the current study for a diving context differs from Bandura's (1977) original model of self-efficacy; potential explanations for this deviation are numerous. As suggested by Samson (2014) the difficulty of the task could affect the influence of physiological and emotional states. The assertion that task difficulty could influence the importance of certain sources of self-efficacy could begin to explain the difference between the scores of each source in high level and lower level divers. However, as the hierarchy of the sources of self-efficacy presented in the same order for higher ability and lower ability divers task difficulty may not effect the sources of self-efficacy

between diving groups but may support the difference between diving and other sports. Despite the fact the assertion of task difficulty follows a logical argument further investigation would be necessary to establish if the difficulty of the task is related to the influence of physiological and emotional states. The lack of difference between groups suggests the difference in the hierarchy of the source of self-efficacy could be due to the specific demands of diving as a sport (Shwedeh et al., 2016). Diving is a performance sport and is judged by opinion on the aesthetics of the performance, meaning that input from social sources such as judges, coaches and the audience is of the highest importance to diving success. The inherent need for external gratification within diving could explain social persuasion having the most influence on divers self-efficacy beliefs.

Physiological/emotional states were a low scoring significant source of self-efficacy in both high and low-level divers. These findings highlight that divers rated their confidence in their ability to cope with physiological and emotional stimuli to be low, suggesting a potential area for improvement. The findings of the current study showed higher ability divers had higher levels of physiological/emotional states than lower ability divers, presenting the possibility of an effect on performance. As all divers appeared to report low physiological/emotional states it suggests a possible wider effect of the sport rather than a specific environmental factor such as type of coaching strategy or skill level. Existing research has presented mixed opinions, in research by Ward and Vealey (2012) physiological and emotional states scored highly across 13 different sports, including diving, this suggests the results seen in the current study could just be an effect found in one specific sample. However, the diving sample within Ward and Vealey (2012) was very small, including only four participants, when compared to the current study, which included 176 participants. In contrast, findings by Wilson et al. (2004) found physiological and emotional states to be considerably lower than the other sources of self-efficacy across three sports: tennis, swimming and track and field. The potential effect of diving on physiological/emotional states was alluded to in the qualitative findings of study one and two, where divers identified the negative effects of emotions, as well as physical and imaginary barriers. Autobiographical works within the diving domain also support the negative effects of emotions and psychosocial pressures on divers wellbeing and performance (Barrow, 2017; Boudia & Ellsworth, 2016; Daley, 2012; Louganis & Marcus, 2006; Mitcham & Writer, 2012). Other qualitative studies have also reported the perceived negative effect of physiological and

emotional states on perceived self-efficacy and performance ability (Chase, Magyar & Drake, 2005; Samson, 2014). The clearly lower scores on physiological and emotional states does present a potential area for a targeted intervention to improve self-efficacy.

The hierarchy of sources of self-efficacy seems to be effected by the research designs and methodologies used to measure them. This can be seen most evidently with physiological and emotional states. In qualitative research physiological and emotional states seems to be mentioned quite extensively as an influence on self-efficacy and performance (Chase, Magyar & Drake, 2005; Samson, 2014), however in quantitative studies physiological and emotional states is often non-significant or even excluded altogether (Shwedeh et al., 2016; Wise & Trunnell, 2001). The potential effect of research design can be seen in the current study, despite the negative impacts physiological and emotional states being mentioned extensively during study one and two, it still appeared as the second source of self-efficacy in quantitative investigation. The discrepancy between the findings of different methodologies could be due to the nuances and individual nature of the effects of physiological and emotional states. The effect of a physiological reaction such as increased heart rate could be interpreted in many different ways depending on the diver. Where as previous success and failure have much less permutations of interpretation making it an easier source of self-efficacy to measure empirically.

The current study did have two major limitations. Firstly, the variable of ability level was determined by a self-report measure of competition level, which differs vastly between diving communities. The current study used an international sample but only presented competition levels associated with the British Diving system. British Diving splits junior divers into several different levels of competition, lower level divers are skills level, intermediate level divers are age group divers and higher-level divers are junior elite divers (British Diving, 2007). However, different countries have very different systems, in Sweden it is based on a letter system from Class A to Class F (Svensk Simdrott, 2017), whereas the USA bases their system on locality of the competition: regional, state, collegiate, national (USA Diving, 2017b). The current study was dependant on athletes being able to accurately translate their ability into the British system. Accurately interpreting their ability level may not have been possible for some athletes resulting in them placing themselves in a group inconsistent with their ability

level, which in turn could have affected the research outcomes. Further research should aim to present a more encompassing rating system for ability that transfers more suitably to an international sample.

Secondly, the current study aimed to use an international sample of diver to present a representative sample of the global diving community. However, many of the leading diving communities were very under represented in relation to their impact on the global diving community. Only a few divers represented countries such as Russia and China that are very influential in the global diving stage, which is not advocative of their influence on the global diving community (FINA, 2017b). The lack of representation from countries such as Russia and China could have been due to the language barriers presented with an English language measure. Future research could aim to present the DIVE-SE scale in alternative languages to allow for accessibility to non-English speaking diving communities.

7.5. Conclusion

The current study has used the newly developed DIVE-SE scale to show a link between self-efficacy and diving ability in an international sample, suggesting a self-efficacy performance relationship in diving. In addition, the presentation of average scores for the sources of self-efficacy in representative sample along with the DIVE-SE scale provides the potential diagnostic tools for diving self-efficacy in an applied setting. The notion of a hierarchical model that differs from Bandura's (1977) model also presents new challenges for further research and applied practise. The low scores recorded for physiological/emotional states in the current study suggest a potential area for improvement using an applied intervention. In addition, the non-significant results of vicarious experience raises the notion that existing interventions focusing on modelling and visual feedback may not be best suited for divers. However, before any intervention can be designed further understanding is needed on the potential self-efficacy performance relationship in divers. The current study presented a link between ability level and self-efficacy but due to the potential discrepancies in recording of ability level further research should aim to address the self-efficacy performance relationship using a more appropriate experimental design. Due to the wide age range of the current study it is easier to make generalisations across the diving community but harder to make specific targeted interventions for certain diving groups. Despite the limitations, the

current study took the initial steps to suggesting the possibility of a link between self-efficacy and performance in diving. A more in depth study to address the self-efficacy performance relationship and the influence of the specific sources of self-efficacy will provide a more sound basis for the development of a targeted applied intervention.

Moving forwards, the next study in the current programme of research should aim to gain a better understanding dynamics of the potential self-efficacy performance relationship in diving. If, as shown in the current study, self-efficacy is low in certain divers does that affect their physiological and emotional states, or is it in fact the discrepancy in physiological and emotional states that is effecting their overall self-efficacy. Further research should investigate the predictive nature of self-efficacy and the individual sources on performance in diving.

8.1. Aim

The current study aimed to explore if self-efficacy can be used as a predictor of competition performance in springboard and highboard diving. Many studies have highlighted self-efficacy as a strong predictor of performance in different sports, such as: volleyball (Barzouka, Bergeles & Hatzihieristos, 2007), billiards (Di Corrado et al., 2015), football (Horn, Williams & Scott, 2002), gymnastics (Gomez-Paloma, Rio & D'anna, 2014), cricket (Hayes et al., 2006) and wheelchair road racing (Martin, 2002). In addition, the link between diving ability level and self-efficacy was suggested in study four of the current programme of research. The findings of the study four suggest higher ability divers have higher self-efficacy levels than that of lower ability divers, which alludes to a potential positive effect of self-efficacy beliefs on diving performance. Moreover, findings from studies one and two of the current programme of research suggested a potential influence of physiological and emotional stimuli on divers performance and skill acquisition. Further knowledge about the self-efficacy performance relationship and the sources of self-efficacy as predictors of performance is necessary for the development of suitable applied self-efficacy interventions within diving.

Studies one and two raised the question of the effect of self-efficacy on performance and the influence of physiological and emotional stimuli on diver's perceptions relating to their ability to perform dives. Due to the qualitative design of studies one and two an in depth insight into the perceptions of self-efficacy in diving was gained but the sample size was small, making generalisation to the wider diving community difficult (Smith, 2015). In contrast, study four investigated self-efficacy in relation to diving ability level and the hierarchy of sources of self-efficacy in an international sample, offering a wider view of self-efficacy in the diving community. Yet the sample used in study four was very diverse in age, ability level, experience level and nationality raising the question if findings from such a diverse sample can be applied to small more niche groups of divers (Creswell, 2015). In addition to the current study's aim to further the understanding of the self-efficacy performance relationship in diving

and self-efficacy as a predictor of performance outcome, the study also aims to act as a point of additional clarification for the findings of the previous studies.

The level of age groups presents an interesting opportunity for academic research, as it is the widest range of ages in a competitive junior event and also a major transitional phase in a divers' career. One of the largest skill acquisition phases in a divers career is the transition between skills and age groups level (British Diving, 2007). A diver is transitioning from performing a small amount of very basic dives from the one-metre board to performing a list of between five and seven complex dives from three different board heights (ASA, 2016; Swim England, 2017). In addition, within study four age group divers were highlighted as having lower levels of self-efficacy than most the other high ability groups, yet age group divers presented with higher scores on the physiological/emotional states sub-scale than divers in other higher ability groups. Findings from study four suggest that age group divers are potentially in a transitional stage in the development physically and mentally, which highlighted a plausible developmental stage to bring in applied psychological interventions to assist with skill acquisition and diving development.

Taking into account the findings from studies one, two, four and existing literature, the current study proposed the following research questions:

- RQ1. Does overall self-efficacy act as a predictor of diving performance in age group divers?
- RQ2. Do the sources of social persuasion and physiological/emotional states act as predictors of competition performance in age group divers?
- RQ3: Is physiological/emotional states the strongest predictor of competition performance in age group divers?

8.2. Method

8.2.1. Design.

The current study used a cross-sectional quasi-experimental design to investigate if the predictor variables of overall self-efficacy, mastery experience, vicarious experience, social persuasion and physiological/emotional states could accurately predict the dependant variable of competition performance in age group divers.

8.2.2. Participants and Sampling

An opportunity sample of participants was recruited from the British National Age Groups Diving Championships 2016. An invitation to participate was sent via email to the chair or head coach of all clubs with divers who had qualified for the British National Age Groups Diving Championships at any sanctioned regional qualifying event. Out of the 25 clubs attending the competition, 15 were involved in the current study, gaining a participant group of approximately 28% of the event competitors. Consent and assent were gained from parent/guardian and the child before any diver participated in the study.

The study used an opportunity sample of 56 divers, however 18 divers were excluded due to non-completion of the measures. Leaving a final sample of 38 divers (male = 20, female = 18) competing across 12 events, divers' age ranged from 9 years 1 month to 16 years 2 months (M= 12 years 5 months, SD = 1 year 6 months).

8.2.3. Measures.

8.2.3.1. Self-efficacy measure

The DIVE-SE scale (see chapter five) was used to measure overall self-efficacy as well as the five sources of self-efficacy: mastery experience, vicarious experience, social persuasion, physiological and emotion states. Due to the design of the measure physiological and emotional states are measured using the same items thus providing a combined score for both sources, creating the variable of physiological/emotional states. The DIVE-SE scale is a two-part scale, part one measures overall self-efficacy and contains eight items, and part two contains 16 items measuring the five sources of self-efficacy. The DIVE-SE scale was designed to be delivered to divers aged 12 years and above, and needed further validation for use with younger divers.

8.2.3.2. Performance measure

Performance was measured using total score gained at the British National Age Group Championships 2016. The total score consists of the individual scores for each dive performed. Group D divers (aged 10 – 11 years) performed five dives from 1-metre, 3-metre or 5-metre. Group C divers (ages 12 – 13 years) performed six dives from 1-metre, 3-metre or platform (a choice of 5-metre, 7.5-metre and 10-metre). Group B divers (aged 14 – 16 years) performed seven dives from 1-metre or 3-metre and 6 dives

from platform, and Group A divers (aged 17 – 18 years) performed seven dives from 1-metre or 3-metre and six dives from platform. Each dive is scored between zero and ten by five judges, the highest and lowest score are discounted and the remaining three scores are added together. This value is then multiplied by the degree of difficulty awarded to the dive to provide the final score for the dive. The degree of difficulty is a numerical representation of how difficult the dive is deemed to be, this is worked out using a formula that takes account for direction, position, number of summersaults, number of twists and other variables.

For example: a diver performs a forward dive with tuck from the 1-metre board, which carries a degree of difficulty of 1.2.

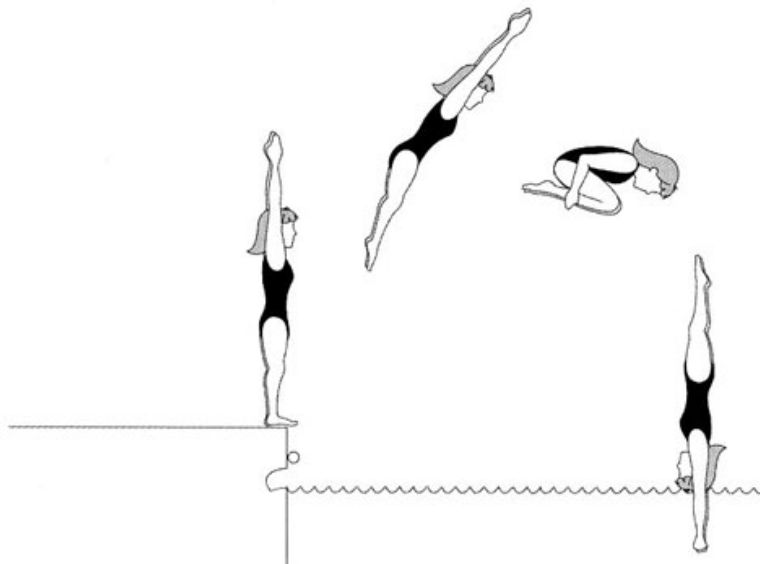


Figure 16: Forward dive with tuck (O'Brien, 2003)

The dive is awarded 5,5,6,5,4 by the five judges; the highest score of 6 and the lowest score of 4 are discarded leaving 5,5,5. These scores are then added together to give a raw score of 15, which is then multiplied by the degree of difficulty of 1.2, to give an overall score of 18 points for the dive (see figure 17).

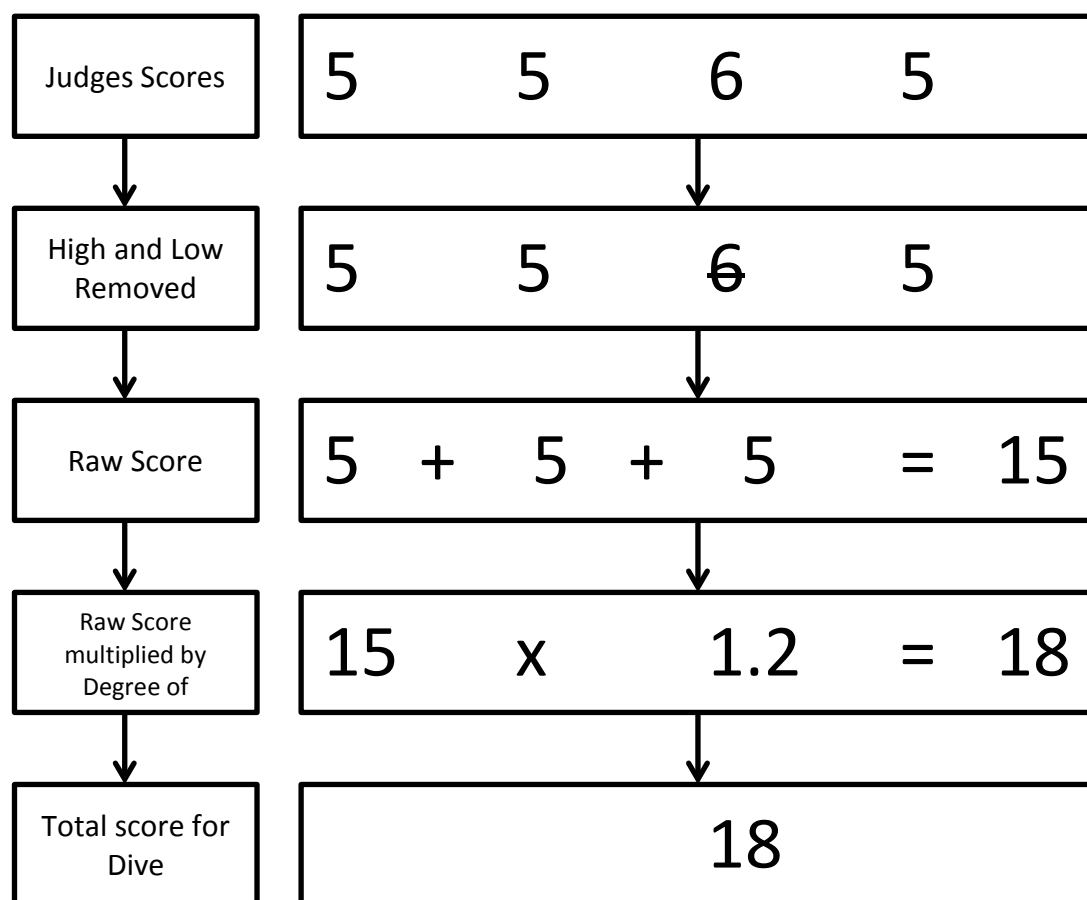


Figure 17: FINA dive scoring process

The total competition score is the accumulation of the individual dives scores and ranges between approximately 80 to 300 points at age group level based on the quality, difficulty and number of dives. This process is the standard method of scoring competitive diving events and is used throughout the international diving community (FINA, 2017a)

8.2.4. Procedure.

Following the completion of consent and assent forms by a parent/guardian and the diver, any diver interested in participating reported to the research desk situated within the venue at an allotted time through the event, so as not to disrupt their competition programme. Divers completed the DIVE-SE scale 2 hours prior to their event, so as not to disturb any pre-performance routine. Divers were asked to complete

the scale based on how they felt about their upcoming event. Divers were given the option to complete the scale more than once if they were participating in more than one event; no diver completed the scale more than once. The DIVE-SE scale was completed either in paper format or on a tablet computer, the choice was left the diver for their preferred method, 86% of participants requested a paper form of the scale. Performance scores were collected from the final results posted online via DiveRecorder™ after the event; the score was recorded for the event the diver had named when completing the DIVE-SE scale.

8.2.5. Data Analysis.

Multiple linear regression analysis with stepwise modelling was used to determine if overall self-efficacy score, or scores on the separate sources of self-efficacy predicted competition performance in age group divers. Multiple linear regression was used as it is a popular and robust, due to its ability to be applied to many different sample types and strong underlying assumptions to reduce data violations (Mason & Perreault Jr., 1991).

8.3. Results

Initial validity analysis was run on the DIVE-SE scale to ensure its suitability for younger divers, as previous studies only validated the study for use with 12 years of age and above. The whole scale has internal consistency ($\alpha=.86$), as did section one that measures overall self-efficacy ($\alpha=.86$) and section two that measures the individual sources of self-efficacy ($\alpha=.74$). For a scale to gain a suitable level of internal consistency the Cronbach's alpha co-efficient score should be between .75 and .90. A score above .90 suggests that some items may be measuring the same variable and thus unnecessary, and a score below .75 suggest poor question design or heterogeneousness (Tavakol & Dennick, 2011). These findings suggest the suitability of the DIVE-SE scale for use with divers as young as nine years of age, but results from the sources of self-efficacy subscale should be interpreted with a level of caution.

Second, a MANOVA analysis was conducted using mastery experience, vicarious experience, social persuasion and physiological/emotional states as dependant variables and the total competition score achieved as the dependant variable, to establish if the hierarchy of sources of self-efficacy was similar between diving samples. Before

conducting a MANCOVA analysis the data must satisfy nine assumptions. The data satisfied assumption one, as two or more of the dependant variables are measured using an interval or ratio level. The second assumption was satisfied as the independent variable is split into two categorical groups. There was independence of observations as no participant was included in both groups satisfying the third assumption. The sample size was small but there were more participants in each group than the number of dependant variables being analysed, satisfying assumption four. No participant responses were highlighted as outliers. All responses fell within three standard deviations of the mean (Wardlaw, 2000), satisfying assumption five. Assumption six relates to multivariate normality or the normal distribution of data, all variables presented as normally distributed with non-significant Shapiro-Wilk scores: mastery experience ($p = .288$), vicarious experience ($p = .1.00$), social persuasion ($p = .633$), physiological/emotional states ($p = .952$) and total competition score ($p = .206$). A linear relationship between dependant variables and each group of the independent variable was present satisfying assumption seven. The Box's M test of equality of covariance was not significant ($p = .833$) satisfying assumption eight. Finally, correlation between variables was below .9 demonstrating no multicollinearity, which satisfied assumption nine. There was no significant difference found between total competition score and any of the sources of self-efficacy. The means and standard deviations of the four sources of self-efficacy were as follows: mastery experience ($M = 79.14$, $SD = 2.24$), social persuasion ($M = 75.21$, $SD = 2.24$), physiological/emotional states ($M = 71.93$, $SD = 2.74$) and then vicarious experience ($M = 61.04$, $SD = 2.70$).

A stepwise multiple regression analysis was used to determine if self-efficacy could predict competition score in age group level divers. The dependant variable was the total score gained in the divers' specified event at the National Age Group Championships 2016. Due to the number of dives performed differed based on age group, divers were only compared with divers in their own age group category: Group D divers (aged 10 – 11 years), group C divers (ages 12 – 13 years), group B divers (aged 14 – 16 years) and group A divers (aged 17 – 18 years). The five predictor variables used in the regression analysis were gained from the DIVE-SE scale: total self-efficacy score, mastery experience score, vicarious experience score, social persuasion score and physiological/emotional states score. Before a multiple regression analysis can be run the data must satisfy five assumptions (Field, 2013). There must be a linear relationship

between the independent variables and dependant variables; scatterplots demonstrated a suitable linear relationship in all variables. The second assumption requires variables to be normally distributed. Histogram plots demonstrated normal distribution in each variable, and the Shapiro-Wilk test was non-significant for all variables (mastery $p = .288$, vicarious $p = 1.00$, social $p = .633$, physiological/emotional $p = .952$, competition score $p = .206$), which further supports the normal distribution of the data. The third assumption requires little or no multicollinearity within the data. Although the sample size was deemed to be small (Miller & Kuncze, 1973) as all assumptions of multicollinearity were satisfied the sample was deemed suitable for the analysis. All variables demonstrated a Pearson's bivariate correlation coefficient of smaller than 1, all variables demonstrated a tolerance T value of above 0.1, all variables showed a variance inflation factor of < 10 and finally all variables had a level of < 10 on the condition index, suggesting little to no multicollinearity within the data (Farrar & Glauber, 1967). The fourth assumption requires the data to have little or no autocorrelation, which is related to the independence of each variable. If the residuals are not independent from each other autocorrelation is seen. The Durbin-Watson statistic (Durbin-Watson = 1.65) is between 1.5 and 2.5 supporting that the data is not autocorrelated. The fifth assumption tests for heteroscedasticity, in which the scatter plot demonstrated a lack of heteroscedasticity meaning the data was suitable for a regression analysis.

A multiple regression was run to predict total competition score from average scores on overall self-efficacy, mastery experience, vicarious experience, social persuasion and physiological/emotional states. The regression model was only significant with group C divers, aged 12 – 13 years, and only scores physiological/emotional states were included in the regression model. Overall self-efficacy, mastery experience, vicarious experience and social persuasion had a non-significant relationship with performance, thus were excluded from the analysis. Physiological/emotional states was measured on a continuous scale. Only physiological/emotional states statistically significantly predicted total competition score ($F(1,16) = 5.977$, $p = .027$, $R^2 = .285$).

8.4. Discussion

The current study aimed to investigate the self-efficacy performance relationship in age group divers, and establish if the sources of self-efficacy are predictors of competition performance by addressing three research questions.

RQ1. Does overall self-efficacy act as a predictor of diving performance in age group divers?

RQ2. Do the sources of social persuasion and physiological/emotional states act as predictors of competition performance in age group divers?

RQ3: Is physiological/emotional states the strongest predictor of competition performance in age group divers?

Initial validity and reliability analysis suggested the suitability of the DIVE-SE scale for use with younger divers. However, the current study only found an effect of self-efficacy on performance in group C divers, divers aged between 12 – 13 years. Current opinion in diving suggests that group C is the optimum age for a diver to be competing at age group level (British Diving, 2005), which may be a reason for the non-significant result in the other age groups. Divers younger than 12 years are not expected to be competing at age group level, suggesting their performance may not be at the level expected at age groups or they may only be starting in the level and lack confidence. On the contrary, divers 14 years and over are expected to be competing at a higher level, suggesting either their performance is not at a standard suitable for a higher level or they have not been selected for progression, both factors that will in turn affect their self-efficacy. This hypothesis linked closely with the four athletic developmental transitions proposed by Wylleman and Lavallee (2003), in which it is suggested that the developmental age transition when athletes move to more complex and intensive levels of training and competition happens between the ages of 12 to 13 years old.

The findings of the current study provided partial support for the second research question, finding that one source of self-efficacy acted as predictor of performance in group C age group divers. The study expected to find an effect of physiological/emotional states on diving performance and this finding is consistent with the current literature and previous studies (Feltz & Mugno, 1983; McGregor & Abramhamson, 2000). However, it was unexpected to find a non-significant effect of mastery experience and social persuasion. In addition to the nature of the study's rigour

these findings could be explained by the transitional nature of the age group level of diving. Many age group divers are in the process of learning higher level dives and have not necessarily been performing them for an extended amount of time, like in other levels of diving such as seniors or masters where a diver may have been performing the same competition list for many years (British Diving, 2005). Consequently many age group divers may not have been performing the dives long enough to have built up a level of mastery experience based on their past successes, which in turn effected the results. In addition, the age of the divers may account for the non-significance of certain sources as a predictor. For example, vicarious experience gained through modelling is very important during adolescent years (Young et al., 2015), whereas the influences of social persuasion from parental figures can have a huge impact on sporting achievement in childhood (Kaye, Frith & Vosloo, 2015).

The study found a negative effect of physiological/emotional states on performance in group C age group divers, which provides limited support for the first research question, that self-efficacy has an effect on diving performance. Only finding an effect on one source may show that only certain sources of self-efficacy are relevant for diving (Feltz & Mugno, 1983). Yet the sources of self-efficacy that were found to be significant are not those found in other research studies (Post et al., 2014; Slobounov et al., 1997). Based on findings from studies one, two and four, it was expected the study would find an effect of social persuasion in addition to the current findings. The lack of statistical significance in the other sources of self-efficacy is more likely due to the statistical rigour of the study than a true representation of the self-efficacy performance relationship in diving.

The initial sample size for the study was small, and the sample was split further to take account for number of dives performed. Miller and Kuncz (1973) suggests a ratio of ten participants to every one variable, using this ratio to ensure statistical rigour the study should have gained a sample size of 50 participants per age group. The sample size was quite small due to the niche nature of the sport of diving but also due to the methods of participant recruitment. Research by Newington and Metcalfe (2014) suggests that a feeling of altruism is the main reason that individuals will participate in research studies, and logistical issues and then perceptions of the researcher were the main reason participants would decline to participate. Another study by Woodall,

Howard and Morgan (2011) highlighted that some participants were reluctant to be involved in psychological research because of logistical issues, the researchers' communication skills and concerns about potential negative effects on their health. As recruitment took place at a national competitive event many potential participants and parents of potential participants refused, as they were under the belief that involvement in the study might have negatively affected their competition performance.

There is a level scepticism towards mental health and psychological services within the diving community, with divers having limited knowledge and support regarding mental health symptoms and services (Coyle, Gorczynski & Gibson, 2017), which could be effecting participant recruitment and retention. This could be rectified in the future by recruiting from a less highly ranked competition or by designing a study to explore the self-efficacy performance relationship in a training setting, as well as providing further support and information to coaches, parents and divers. Another option for addressing the small sample sizes is to conduct the research in a country where diving is a larger, more mainstream sport, such as China or the USA. To illustrate, the USA regional diving championships, which contains 12 age group level competitions across the USA with roughly 250 – 400 entries per event (USA Diving, 2017), as the same diver can have up to three entries per event this offers a potential sample size of approximately 2000 – 3000 divers. A sample size that is considerably larger than the current study's available sample, approximately 200 divers that attended the British National Age Group Championships 2016 (DiveRecorder, 2017).

Another potential explanation for the weaker than expected self-efficacy performance relationship could be the measure of performance used. Competition score does not take into account the relativity of the performance to the divers ability. A diver that has recently moved up to age group level may score 120 points which could be a personal best performance, yet another diver could perform poorly and fail a dive yet score 240 points, using competition points score alone does not account for these type of scenarios. Although in theory all divers competing at age group standard should be at the same level, the reality is very different. Due to the potential skill acquisition phase involved in age group diving, divers can be at very different skill levels within the same age group event (British Diving, 2005). This could be rectified by endeavouring to use a performance rating that encompasses a competition performance in relation to

past performance ability to gain a more detailed insight into the effects of self-efficacy on performance.

The findings of the current study supported the third hypothesis that physiological/emotional states would have the most influential effect on competition performance. Within the current sample physiological/emotional states had a negative effect on competition performance, suggesting the perception of physiological and emotional stimuli potentially hampers performance and in turn reduced competition score. The negative effect of physiological/emotional states further supports the findings of existing research in other sports (Campo et al., 2016; Lazarus, 2000), along with the findings of study one and two. Within studies one and two divers described the negative impacts of emotions, physical and imaginary barriers on their training, skill acquisition and competition performance. Finding a consistent negative effect of physiological and emotional stimuli on divers across several studies further highlights the potential for an applied intervention to address this effect.

8.5. Conclusion

The current study provided further support for the existing body of research and results presented in the current programme of research. The findings of the current study provide further quantitative support for the qualitative findings of study one and two, along with furthering the findings of study four. A limitation of the current study is the specific nature of the sample. The current study focused on an age group diving sample due to the transitional nature of the level and the accessibility of the divers (Swim England, 2017). Lower ability divers were not used as their experience level was very varied and would have presented difficulties when aiming to recruit sample of similar divers to compare. In addition, it was difficult to focus on higher ability divers due to the smaller number of divers at a higher level. The lower numbers of divers at the higher ability levels would have drastically reduced the sample size available. Moreover, access to higher-level divers at international level is much harder to negotiate, due to the time and travel demands of their training programme.

In addition to enhancing the current body of literature in relation to self-efficacy in diving, the current study also highlights a potential gap in the applied research available in diving. Findings from studies one, two, four and now five have provided

suitable support for the development of an applied self-efficacy intervention to attempt to improve diving performance. The current study also provide further support and clarification to the qualitative findings of study one and two, in which divers highlight their thoughts on the detrimental effects of physiological and emotional stimuli on their performance. With further quantitative support from the current study future studies should focus on the development of an applied intervention for the improvement of coping in relation to physiological and emotional stimuli, to in turn potentially improve diving performance in competition and training. To this end, the next study in the current programme of research will seek to take the first steps to develop and test a suitable diving specific self-efficacy intervention to potentially improve diving performance.

9.1. Aim

The final study in this programme of research was designed to test an arousal re-appraisal intervention designed specifically for diving with a sample of competitive divers. The intervention was designed to encourage re-appraisal of physiological and emotional stimuli by challenging negative thoughts and feelings with the goal of re-appraising them into a more positive framework. The intervention was based on physiological and emotional stimuli as both were consistently mentioned as having a significant impact on diving specific self-efficacy beliefs during the preceding studies in the current programme of research. A case study design was used for the current study to allow for testing and validation of a diving specific intervention within a naturalistic environment.

Single case study research has been used in diving when exploring different physical and psychological interventions (Badman & Rehtine, 2004; Hosey, Hauk & Boland, 2006; Schwanhausser, 2009). Existing research has reported a positive effect of self-efficacy based interventions on performance and self-efficacy levels in athletes (Chang et al., 2014; Feltz, Short & Singleton, 2008; Ste-Marie et al., 2011a). Moreover, arousal re-appraisal interventions have demonstrated some success in improving self-efficacy, psychological wellbeing and performance in tennis (Puig & Pummell, 2012) and rugby (Edwards & Edwards, 2016). A study by Puig and Pummell (2012) involved an adolescent tennis player keeping a thought diary in which he had to report the situation he was in, the emotions and physical symptoms he experienced and the thoughts and images that resulted from the stimuli. Another case study by Edwards and Edwards (2016) involved an adult rugby player engaging in Cognitive Behavioural Therapy (CBT), which revolved around challenging negative thoughts, thought stopping and patterned thinking. Research by Jamieson, Mendes, and Nock (2013) suggests that the re-appraisal of physiological signals can break the link between negative experience and physiological responses.

It is the main aim of the current study to establish if replacing the negative response to a physiological or emotional signal with a positive response can improve performance and self-efficacy while reducing anxiety in divers. The current study aimed to answer the following research questions:

RQ1: Can an arousal re-appraisal intervention improve self-efficacy in competitive divers?

RQ2: Can an arousal re-appraisal intervention improve training performance in competitive divers?

RQ3: Can an arousal re-appraisal intervention reduce anxiety in relation to new and complex diving skills in competitive divers?

9.2. Method

9.2.1. Design.

The current study employs a multiple case explanatory research design, utilising Yin's (2013) three principles of data collection and six sources of data to gain insight into the effect of an arousal re-appraisal intervention on adolescent divers. Data analysis was based on theoretical propositions, meaning self-efficacy and performance theory guided the study's design, as well as the interpretation and analysis of the data collected. Explanation building was used as the main analytical technique, which involved the development and revision of theoretical constructs to provide an explanation of the case and identify potential causal links between the effects of the intervention and behaviour/performance outcomes. Pattern matching was used as the secondary analytical technique, which compared the data against expected outcomes and rival explanations. Case study research is often used in behavioural, health sciences and sport as they provide a platform for testing, validating and demonstrating new interventions (Barker et al, 2011).

9.2.2. Participants and Sampling.

Participants were recruited from two diving clubs in the UK. An initial invitation was sent to the head coach and club chairperson via email inviting the club to put forward any divers interested in partaking in the study. Twelve divers initially volunteered, but due to competition and time commitments, only three divers were able to complete the study. All three divers were female, between the ages of 13 – 15

years old, competing in national age group level competition in the B-girls category (ages 14 – 16 years).

9.2.3. Measures.

9.2.3.1. Self-efficacy measure

Baseline and post intervention measures of self-efficacy were taken using the DIVE-SE scale, a diving specific self-report self-efficacy measure. The DIVE-SE scale is a 24-item measure of self-efficacy, which five sub-scales measuring overall self-efficacy, mastery experience, vicarious experience, social persuasion and physiological/emotional states. The DIVE-SE scale has been validated for use with children and adolescents ($\alpha = .86$) (see chapter six and seven).

9.2.3.2. Anxiety measure

Baseline and post intervention self-report anxiety ratings were taken on a scale of 1 (nothing scares me) to 10 (I am scared of everything). Participants were also asked to document their anxiety levels for each session in their training diary using a Likert scale (1 – none at all, 7 – extremely high). As the study only required a measure of state anxiety in relation to diving a simple single question was used to avoid long and unnecessary anxiety measures (Chorpita et al., 2000; Spence, 1998), reduce questionnaire fatigue and reduce the chance of participant drop out (Rolstad, Adler & Ryden, 2011) due to the length of the training diary.

9.2.3.3. Performance measure

Baseline and post intervention self-report performance ratings were taken on a scale of 1 (I'm at the worst I've ever been) to 10 (I'm performing better than I ever have done). In addition, qualitative measures of performance were taken from the diver, coach and diver's parents. The diver, coach and parent were asked to complete a set of self-report questions highlighting the behaviour of the diver towards new or complex dives before and after the intervention. Research suggest that subjective self-report measures of performance are more accurate than objective measures of sports performance (Saw, Main & Gastin, 2015). The additional self-report measures of performance by coaches and parents act as a method of triangulation to increase robustness of the measure (Smith, 2015). Moreover, observational data was collected by an impartial researcher about the divers training performance, attitudes towards

new and complex skills and general behaviour in training before and after completion of the intervention, to provide further insight into any potential behavioural changes that could have resulted from the intervention. The researcher had prior knowledge of diving and held a level two diving coaching certificate.

9.2.3.4. Intervention

The arousal re-appraisal intervention used in the current study was adapted from previous studies (Edwards & Edwards, 2016; Greenberger & Padesky, 1995; Puig & Pummerl, 2012). The intervention included a 30 minute workshop, designed based on the premises of CBT (Beck, 2011; Edwards & Edwards, 2016). Within the workshop session participants were taught the basics of challenging negative thoughts and replacing negative imagery or thoughts with a more positive alternative.

Following the workshop, participants were given a training diary to complete that required them to use the skills acquired in the workshop session to acknowledge a negative thought, symptom or emotion, write in detail the thought and how it affected their training session. Following the acknowledgement of the negative thought, participants are asked to rate its intensity in relation to the entire session and at the highest point of anxiety on a 7 point Likert scale (1 – none at all, 7 – extremely high). Following the instructions in the training diary and skills acquired in the workshop participants were then prompted to re-appraise and replace the negative thought, emotion or stimuli with a positive alternative. For example: a diver may acknowledge that trying a backwards dive from a higher board has caused them to worry they may hurt themselves. The diver may re-appraise the negative thought by confirming with their coach that they are capable of performing the skill safely, and then replace the thought with a more positive alternative such as 'my coach thinks I am good enough to do this dive'. The training diary documentation, wording and CBT based approach was based on existing research studies using CBT and arousal re-appraisal in a clinical and sporting context (Greenberger & Padesky, 1995; Puig & Pummerl, 2012). Participants were instructed to complete their training diary for each session in a quiet room within one hour of the end of the session. Participants were also asked to document their adherence to the intervention for each session, by rating the effort they gave to the intervention on a Likert scale (1 – none at all, 7 – extremely high). Participant completed a training diary for five consecutive training sessions within one month of attending the

workshop. After completion of the training diary for five consecutive sessions participants were instructed to use the skills developed in the intervention for a further five sessions without the use of the training diary.

9.2.4. Procedure.

Baseline measurements of self-efficacy, performance and anxiety were taken one week prior to the commencement of the intervention. In addition, divers behaviour was observed during a normal training session one week prior to the commencement of the intervention. Divers, parents and coaches were invited to attend a 30 minute workshop, in which the intervention was explained and examples were presented for how to recognise, evaluate and re-appraise negative thoughts and feelings. Following the workshop divers were asked to complete a training diary for five consecutive training sessions, in which they had to recognise, evaluate and re-appraise a negative thought or feeling from each session, along with reporting anxiety levels and their perceived effort to adhere to the intervention. After the completion of the written training diaries, participants were then asked to use the process of recognising, evaluating and re-appraising negative thoughts within their normal training without the use of written prompts for a further five consecutive sessions. After the completion of a further five sessions post interventions measures of self-efficacy, performance and anxiety were taken. Participants, parents and coaches were also asked to evaluate the intervention. Finally one week after the completion of the intervention a second training session observation took place.

9.2.5. Data Analysis.

Qualitative data collected from the pre and post intervention questions, training diaries and training session observations was analysed using thematic analysis and open coding (see study one and two). Initial meaning units were highlighted and then grouped into themes. The highlighted themes were then categorised based on if they demonstrated a positive or negative change in performance, self-efficacy or anxiety.

Quantitative data collected from the DIVE-SE scale, performance measure and anxiety measure was analysed using an AB model visual analysis. Visual analysis is a basic but well used methodology within single case research design as it allows for the

comparison of baseline and post-intervention tests with very small sample sizes (Harrington & Velicer, 2015)

9.2.6. Validity and Rigor.

Triangulation was used in an attempt to ensure reliability and validity of any findings in the current study (Smith, 2014). Several methods of measurement were used, both qualitative and quantitative. Qualitative measures such as reflective evaluation and observation were used, and to ensure trustworthiness member-checking protocols were used during the analysis of all qualitative data. Quantitative data collection methods such as self-report questionnaires were used and data was analysed using visual analysis. In addition, all information collected was collated in a case study database and was used to critique, adapt and evolve the research design to ensure the collection of relevant, detailed data (Yin, 2013).

9.3. Results

The current study was conducted using a single case study methodology (Barker et al., 2011; Yin, 2013) yet included multiple participants, so for reader ease results will be presented separately for each participant. Participant names have been changed for confidentiality.

9.3.1. Participant 1: Amy.

Amy is a 15-year-old female diver who has been diving competitively for six years. She has competed at national championships in both skills and age group levels, and she currently competes at age group standard in the 14 to 16 years category. Amy has a previous gymnastic background and maintained her gymnastics for several years after beginning her diving. Amy left gymnastics following her move up to age group diving level in 2014. Amy currently holds county level titles in both the 1 metre and 3 metre events, but currently does not compete on platform.

Prior to the intervention Amy's coach reported despite Amy's superior physical ability she was reluctant to try new skills or more complex skills and this often affected her competition performance as she often would not have the correct skills at an appropriate standard for a competition.

It has got to the point of having to ask her to withdraw from competitions before she will attempt the new dives we are adding to her skill list. She loves competitions and she will attempt skills in order to get to a competition, often without leaving enough time to improve the dive ready to compete.

Amy's avoidance of new or more complex skills was mirrored in both her pre-intervention comments and her parents. Amy highlighted that she actively seeks out ways to avoid learning new or more complex skills.

I always try to find a way to get out of doing the new dive I aim to achieve by spending a long time working up to it with lead ups or just avoiding the dive completely because it is out of my comfort zone.

In addition the observation of Amy's behaviour by a researcher also highlighted Amy's avoidance behaviour. Amy was seen to procrastinate and avoid training in several different ways, initially Amy was slow to start her session as she chatted with members of her team and thus joined the session late. Also following the request by coaching staff to attempt a more complex dive Amy's effort and quality of dives fell dramatically. She began performing the preparatory lead up skills to a much poorer quality than prior to the request to perform a more complex dive, suggesting the drop in quality was also avoidance behaviour to ensure coaching staff would not move her on to the more complex skill.

Amy reported her effort to adhere to the intervention for each session; her average perceived adherence was 71%. Amy completed the ten-session intervention across 28 days. Amy was asked to describe the dive or situation in the session which she perceived caused her the most anxiety, consistently she describe new or complex skills or diving off higher boards, "Back one and one half on three metre springboard. I am quite nervous to try this new dive on three metre as I am very worried that I won't spin fast enough". Amy was also consistent in her perception of her inability to perform; her reported thoughts were about performing the dive incorrectly or hurting herself, "That I wont get my arms up behind my head and not make the dive and I might throw too much and over rotate. I can't do it because I will hurt myself". Amy used the skills taught in the workshop and throughout the training diary documented her ability to re-appraise the negative thoughts of her inability to perform, often mentioning the lack of evidence for her thoughts "There isn't anything to say that I can't do it, so I should just try and see what happens". Towards the end of the intervention Amy began to

document positive results, “I can do this and I will do this. I did both new dives and I am really pleased”.

Amy’s overall self-efficacy level increased by 6.96% between pre and post intervention tests, with her physiological and emotional states self-efficacy level increasing by 17.28% (see figure 18). Before the intervention Amy presented with her overall self-efficacy levels and physiological/emotional states level in the 50th percentile based on diagnostic figures developed in study three (see chapter six). Following the intervention her overall self-efficacy level had improved but remained in the 50th percentile, however her physiological/emotional states levels had improved to the 75th percentile.

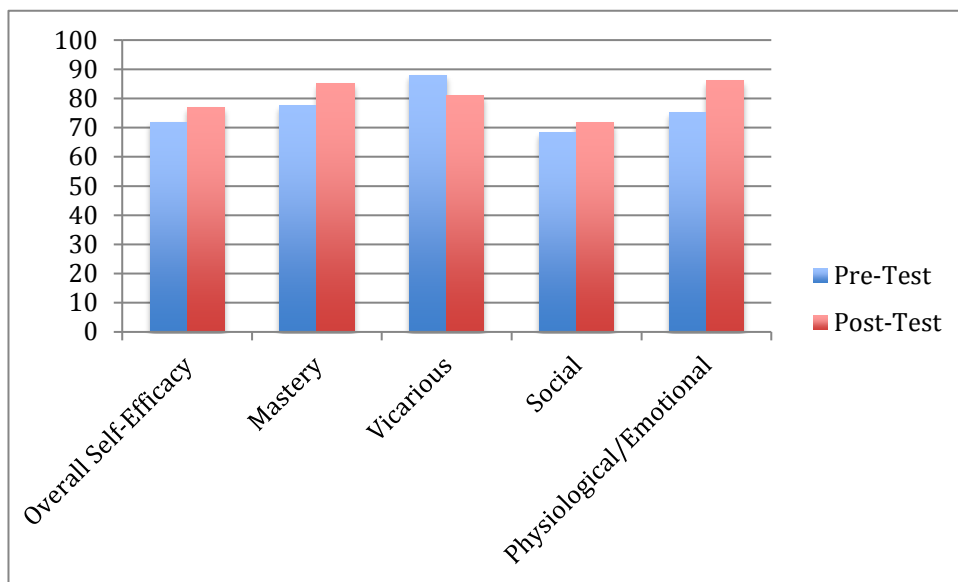


Figure 18: Amy’s self-efficacy levels

The intervention appeared to have no effect on Amy’s anxiety levels as she reported the same level of anxiety on both pre and post intervention measures, and her anxiety levels during the intervention were fluctuating (see figure 19).

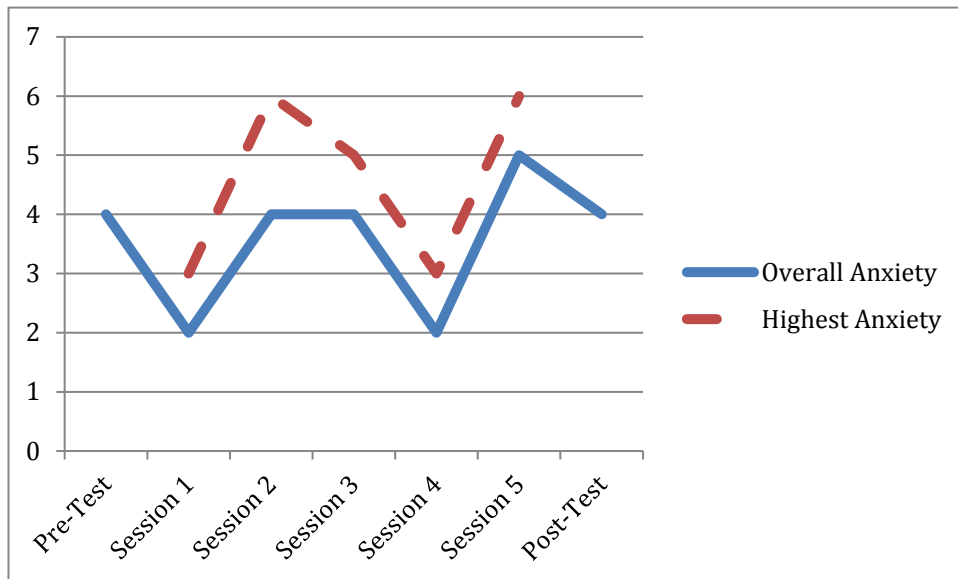


Figure 19: Amy's anxiety levels

Amy's quantitative self-report measure of performance pre and post intervention showed no improvement, however the qualitative performance measures tell a very different story. After the completion of the intervention Amy, her coach and parents all had very positive comments about the change in Amy's behaviour. Amy highlighted she felt more positive and willing to try new dives and had seen an improvement in her approach to new dives. In addition, her comments highlight that evaluating her thoughts has now become a part of Amy's thought process, "The reason for me being keen to try to learn new dives is that there is no evidence to say that I can't do the dive". Amy also highlighted positive results in her diving since the intervention, which she attributed to the effects of the intervention, "I believe that this intervention has worked for me as I have a completely different mindset and am willing to learn new dives, where I wasn't beforehand. I have now performed three new dives since completing the intervention".

Amy's parents also reported similar positive opinions about the change in Amy's behaviour as a result of the intervention, "the intervention has most certainly instilled some self belief in Amy's diving as she has tackled and executed some new, more complex dives well!".

The positive behaviour change was also reported by coaching staff.

Amy's behaviour has changed dramatically since engaging in the intervention study. Amy is much more assertive with her targets and sets her self short and long term goals, and sticks to them. Her diving has improved significantly, she is now learning new and more complex skills nearly every session, and her competition lists have become more competitive and closer to those of her peers.

Amy's coach also highlighted a difference in Amy's behaviour outside of her diving training.

I feel teaching Amy to question her negative thoughts has not only improved her diving but also her approach to learning new skills and trying new things outside of the pool. Amy has become much more confident in her ability to be a role model to the younger divers, and now is often seen talking to and encouraging younger divers by teaching them similar skills she has learnt in the study

Finally, the post intervention training session observation also demonstrated a change in Amy's behaviour at diving. Amy entered the session promptly, whereas before she would be slow to begin. Amy approached her coaching staff with her own goals for the session and set and stuck to strict timescales. Despite recognising her worries about performing more complex dives on higher boards, Amy was able to plan and execute a focused training session in which she learnt a new dive from the lower board and made plans with coaching staff to move the dive up to higher boards in subsequent sessions.

9.3.2. Participant 2: Michelle.

Michelle is a 13-year-old female diver who has been diving competitively for three years. She has competed at national championships in both skills and age group levels, and she currently competes at age group standard in the 14 to 16 years category. Michelle had no gymnastics or trampoline background before coming to diving. Michelle has county level medals for the one metre and three metre boards, and has recently begun diving in platform events. Michelle has known anxiety problems in and out of the diving environment.

Before the commencement of the intervention study Michelle's coach reported that she had suitably high ability and a good attitude towards progression but was very self-critical and struggled with accepting feedback.

Michelle has some of the best movement skills in the diving team, she is strong, powerful and graceful all in one package. She struggles with her spatial awareness but compensates with her courage. Michelle however cannot see any of this. She has little belief in her abilities and believes she is holding back the group with whom she dives. Michelle will attempt dives before any of the rest of her group, because she sees it as risk taking and dangerous. She does not accept praise well from the coaching staff or her fellow divers. She does however give praise and encouragement to her fellow dive team members.

Michelle herself struggled to articulate her feelings towards new or more complex dives and her comments to questions were very short. When asked how she felt about new or more complex dives Michelle replied, "A bit nervous, not sure why. However if I splat it would be funny and only hurt for five minutes so I can get over it". Michelle's parents' comments mirrored that of her coaching staff, highlighting Michelle's willingness to progress but her struggles with anxiety and self-evaluation.

Michelle has always thrived on learning new dives but often gets really worked up prior to undertaking the dive. It is obvious that her anxiety gets the better of her and you can visibly see the battle of mind over matter by her body language i.e. shaking and fidgeting on the board prior to take off.

During the pre intervention training session observation Michelle's behaviour was almost confrontational when interacting with coaching staff. Michelle did not follow instructions well, and at one point removed herself from the training session due to a request from a coach to try a specific skill. Michelle seemed more confident performing more complex skills but was reluctant to try skills that required a higher level of quality.

Michelle reported her effort to adhere to the intervention for each session; her average perceived adherence was 31%. Michelle completed the ten-session intervention across 12 days. Michelle's adherence score appears low because for session three Michelle reported no anxiety and so did not complete the rest of the training diary for that day, and reported making no effort to challenge her negative thoughts in session five. During her training diary Michelle reported complex dives from higher boards being the main cause of her anxiety, as well as the pressure of an upcoming competition. The thoughts Michelle reported were very negative, hyper critical and could be interpreted as quite psychologically damaging. For example, when commenting on her feeling towards a reverse one and one half summersaults from the three-metre board Michelle wrote, "Don't really want to do it. Can't do it. You're rubbish. I should quit. If I don't do it

‘I’m going to hate myself’. In a later session Michelle commented on her anxieties towards an upcoming national qualifying event, “I can’t compete and I don’t want to and I’m useless and worthless and I don’t deserve to be here”. In the same session Michelle mentioned feeling out of control of her thoughts and describing them as a separate entity, “I wasn’t scared I just can’t change the voice in my head. I hate her”.

Michelle’s overall self-efficacy level improved by 2.13% following the intervention, however her physiological and emotional states self-efficacy score decreased by 38% (see figure 20).

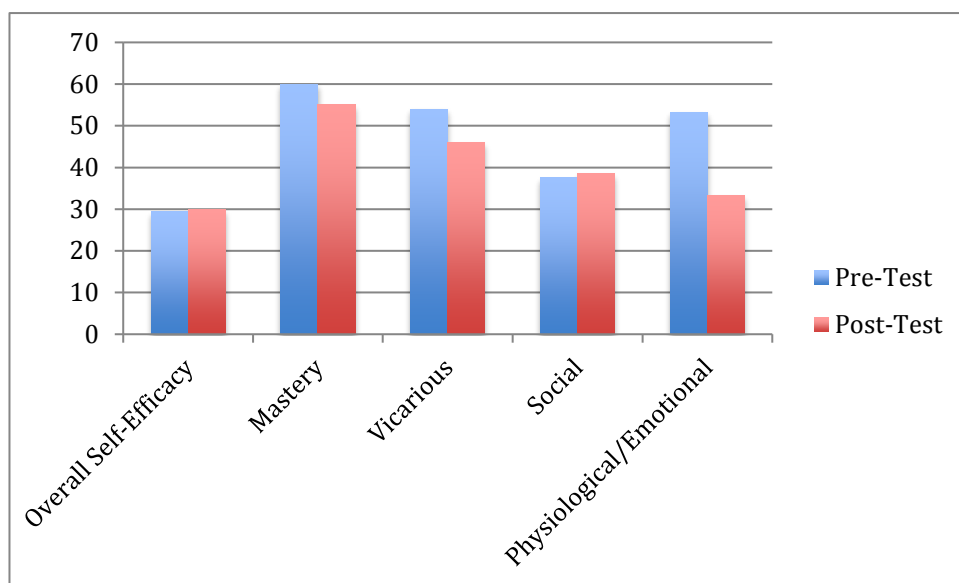


Figure 20: Michelle’s self-efficacy levels

Michelle’s anxiety level reduced by 60% in the post intervention tests, and her anxiety during the intervention fluctuated dramatically (see figure 21). Before the intervention Michelle presented with her overall self-efficacy levels below the 5th percentile and her physiological/emotional states level in the 10th percentile based on diagnostic figures developed in study three (see chapter six). Following the intervention her overall self-efficacy level had improved but remained below the 5th percentile, however her physiological/emotional states levels had decreased to below the 5th percentile.

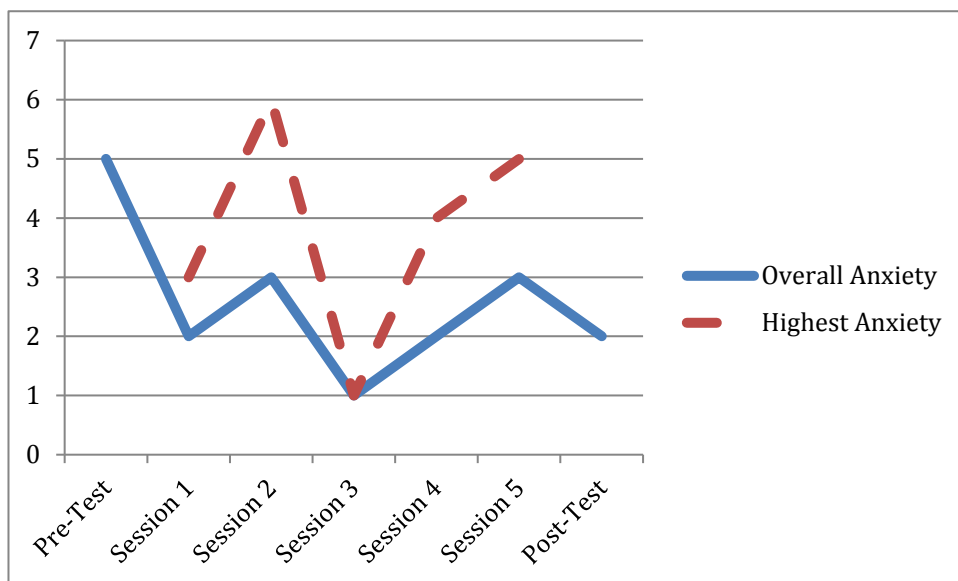


Figure 21: Michelle's anxiety levels

The self-report quantitative measure of performance showed no improvement between the pre and post intervention measurements. The qualitative evaluation by Michelle, her coach and her parents provided mixed opinions on the success of the intervention. Michelle maintained she felt the intervention has no positive effect on her performance, *"I'm still the same and I'm hard like that so my mind won't really be positive"*. In contrast, comments from Michelle's coach and parents was much more positive. Michelle's coach mentioned an improvement in Michelle's overall outlook and that she was more receptive to positive feedback after the intervention than prior to the her involvement in the study.

Michelle's outlook has improved since being involved in the intervention, she is a lot more open to feedback and had begun accepting praise when she is having a good session. She is still experiencing self-doubt and is very critical of herself. Yet she is more open with coaching staff, peers and her parents about how she is feeling which I think is a step in the right direction. I think the intervention has helped Michelle to challenge some of her negative thoughts and feelings. I think she still has a long way to go before she truly sees what everyone else sees, but she has made a start

Michelle's parents' comments were very similar, mentioning an improvement in Michelle's overall attitude and her movement towards more positive thinking.

Since the intervention, Michelle has become more confident. She takes less time on the board for take off and her general demeanour is more positive. Her confidence has definitely increased and although there is still scope for improvement, a more positive child is on the board ready to take on new challenges

Finally the post intervention training session observation also supported the positive comments of Michelle's coaching staff and parents. Michelle presented as more sociable with her peers, no longer isolating herself during training. Michelle was able to be unsuccessful in attempts at a new skill and maintain a positive attitude, making jokes rather than being hyper critical of her performance. Michelle also appeared to be accepting positive feedback from coaching staff and peers, which is dramatically different to the prior training session observation.

9.3.3. Participant 3: Sarah.

Sarah is a 14-year-old female age group diver with six years of competition experience. Sarah had no gymnastic or trampoline background before coming to diving. Sarah was recruited for diving via the England Talent identification process in 2011 through her school, and narrowly missed out on selection to the England Talent second phase in 2012. Sarah has competed at national standard at both skills and age group levels, holding age group county titles in all three disciplines in 2014 and 2015. Sarah had a break from competition for the 2016/17 season to recover from a leg injury and is currently regaining her dives to begin competing again in the 2017/18 season.

Prior to Sarah's involvement in the intervention study her coach reported that as a child Sarah had a lot of potential but since becoming an adolescent she has struggled with her self-belief and it has had a negative effect on her diving.

When she was younger she would take and follow instruction very well, however when she moved up a level to age group (12/13yrs) she started to self-analyse her diving. Her basic movement skills are excellent, but she has difficulty in allowing those skills the freedom when performing more complex dives. This shows in spending far too long on the pre-dive stage on the end of the diving board, by which time she has fatigued the big muscle groups required for a strong effective take off.

Sarah also recognised that her diving is affected by her anxiety and mentioned it halting and even reversing her progression, “I am constantly scared and very hesitant to try anything. I’ve ended up going backwards and struggling to do more complex dives, which I know I could do”. Although Sarah’s parent’s comments were limited, they also recognised Sarah struggles with her anxiety and it slows her progression in diving, “lacking in confidence, will not attempt any new dives, Scared of not succeeding”.

During the observation of Sarah in a training session before the commencement of the intervention study, a researcher also documented Sarah’s anxiety having a compound effect on her diving. Sarah made little effort to progress to more complex skills, often ignoring coach’s suggestions to try a different skill. In addition, despite her teammates performing on different boards, Sarah elected to train with the younger, less able members of the club rather than attempt the more complex skills her peers were trying.

Sarah reported her effort to adhere to the intervention for each session; her average perceived adherence was 54%. Sarah completed the ten-session intervention across 24 days. This is lower because for session two Sarah reported no anxiety and so did not complete the rest of the training diary for that day. When asked to describe the dive or situation that caused her the most anxiety in a session, Sarah described solely twisting skills. She reported that she thought the dives would go wrong and result in injury from either landing on the board or incorrectly in the water, “I thought I was going to hit the board or land flat after the twist”. Sarah made clear attempts to re-appraise her negative thoughts, mainly by telling herself that “it will be fine”. Sarah did not truly evaluate the thought for every session, often instead giving herself coaching points or repeating coaching points given by the coaching staff, “Just do it slower and with less power and it won’t go over”.

Sarah’s overall self-efficacy level improved by 0.6% following the intervention, however her physiological and emotional states self-efficacy score improved by 27% (see figure 22). Before the intervention Sarah presented with her overall self-efficacy levels below the 5th percentile and physiological/emotional states level in the 5th percentile based on diagnostic figures developed in study three (see chapter six). Following the intervention her overall self-efficacy level had improved but remained

below the 5th percentile, however her physiological/emotional states levels had improved to the 10th percentile.

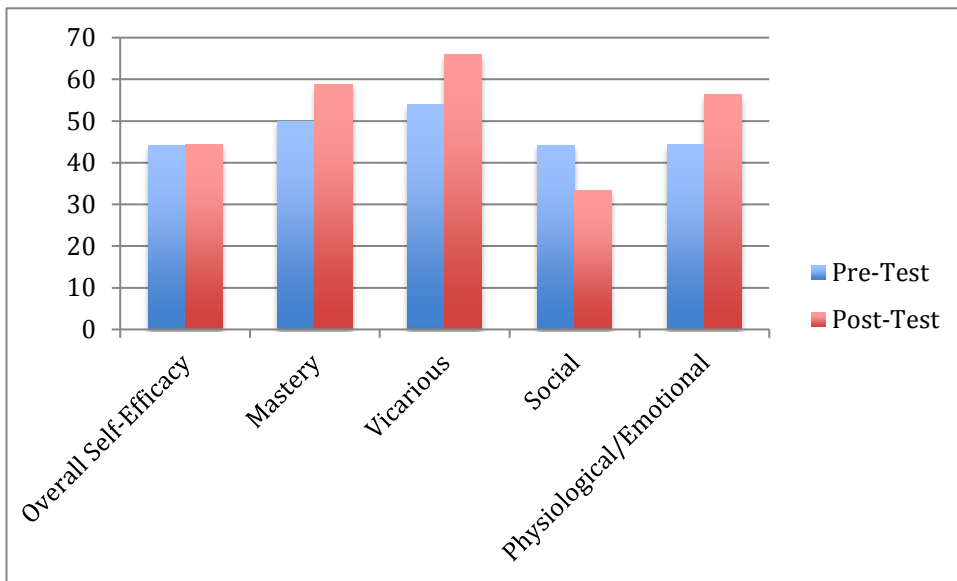


Figure 22: Sarah's self-efficacy levels

Sarah's anxiety level reduced by 20% in the post intervention tests, and her anxiety during the intervention was low (see figure 23).

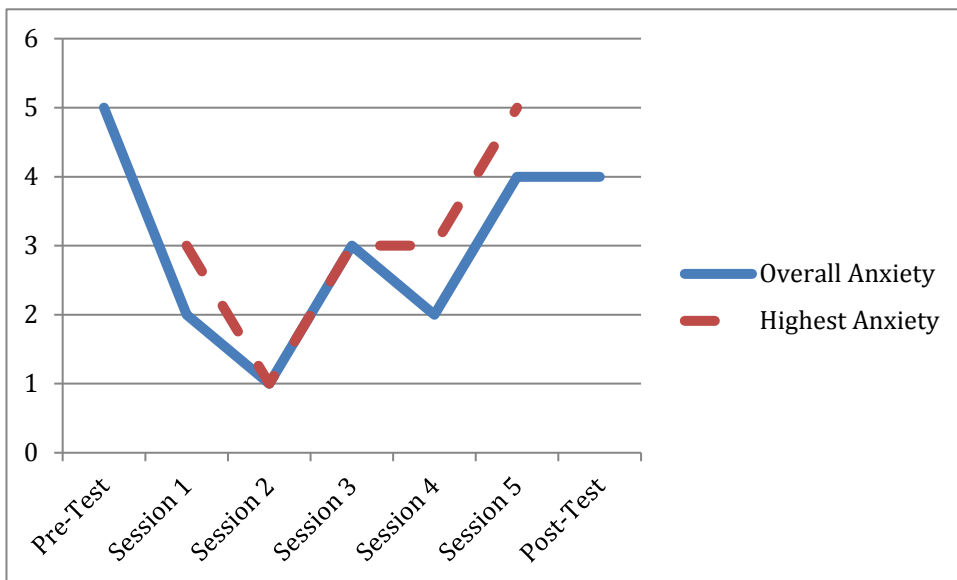


Figure 23: Sarah's anxiety levels

The self-report quantitative measure of performance showed no improvement, yet the qualitative evaluation by Sarah, her coach and her parents provided positive comments

on the difference in Sarah demeanour and performance in and out of the pool. In the post intervention evaluation Sarah commented on a changing in her behaviour and her mental approach to diving.

I am beginning to become less hesitant and am starting to try new dives. I also feel as though my dives are progressing into more difficult dives. I have increased in confidence and am beginning to improve in my mentality.

Sarah's coach also highlighted a positive impact on Sarah's performance in training that they attributed to the effects of the intervention.

Sarah has shown a marked improvement in her approach to new or more complex dives. She is more proactive in her training and requesting to attempt new skills, and if a skill is suggested to her she will progress and attempt the skill more often than not.

Sarah's parents agreed with the positive comments of coaching staff and Sarah herself, commenting that her diving is progressing and she is moving forwards with her training, "dives she felt she no longer could do she now attempts and succeeds in doing".

Finally the post intervention training session observation further supports the positive comments of diver, coach and parent. On observing Sarah's behaviour at a diving session following the completion of the intervention, Sarah was seen training with her peers instead of younger less able divers. Sarah is also attempting new and complex dives at the same time as her peers, along with performing her skills from higher boards, which are all things Sarah would actively avoid before the intervention.

9.4. Discussion

The current study aimed to use a diving specific arousal re-appraisal intervention to increase self-efficacy and performance in divers, as well as reduce anxiety. The study used three individual case studies to investigate the effects of the intervention on divers in detail. Across the three case studies self-efficacy levels were higher following the intervention. In addition, two of the three divers reported a reduction in anxiety. Moreover, two divers, along with the coaching staff and parents of all three divers reported improvements in their performance and wellbeing. The results of the current study provide support for the findings of existing research suggesting psychological and physical interventions can improve performance and wellbeing in

divers (Badman & Rehtine, 2004; Hosey, Hauk & Boland, 2006; Schwanhausser, 2009). In addition, the findings of the current study provide a level of support for the existing literature investigating the positive effects of arousal re-appraisal on performance in sport (Edwards & Edwards, 2016; Greenberger & Padesky, 1995; Puig & Pummerl, 2012).

However, only the qualitative measures of performance in the current study suggested an improvement following the intervention. The quantitative self-report measure for performance increase reported no increase for any of the participants between the pre and post intervention tests. This could have been due to the simplicity of the quantitative measure for performance, which consisted of a single self-report question asked to the divers. Whereas, the qualitative measures of performance were used with the diver, coach and parent, giving a much deeper understanding of the intervention and its effect on the divers performance. Studies have shown a discrepancy between self-report ratings of performance when compared with observer ratings of performance (Rapee & Lim, 1992), participants are often much more critical of their performance than external observers (Norton & Hope, 2001). To provide further support for the qualitative performance measure a Likert rating of performance could be given by coaching staff or even an impartial judge to give a more unbiased measure of any potential performance increase. However due to the subjective nature of diving it is difficult to get a true objective measure of diving performance.

The intervention demonstrated differing levels of success with different participants. Amy appeared to have the most positive increase in self-efficacy levels and reported the most positive impact on her performance. Sarah demonstrated the most positive increase of physiological and emotional states self-efficacy, which was the source of self-efficacy the intervention was targeted at. Whereas, Michelle demonstrated the largest reduction in anxiety of the three divers, however Michelle reported feeling the intervention had little effect on her diving and behaviour. When considering the different levels of effect the intervention had there were several different variables to consider.

Firstly, the adherence levels were markedly different between the participants. Amy adhered strictly to the intervention and saw very positive results. In contrast,

Michelle reported much lower adherence to the intervention and saw much lower level of improvement. The disparity in the results between participants suggested that increasing the effort and adherence to the intervention process could increase the potential for more positive results. The findings of the current study in relation to the effect of adherence on intervention success supports the current literature, which posits the more a participant attends and adheres to an intervention the more improvement will be seen (D'Alonzo, Stevenson & Davis, 2004).

Secondly, Michelle completed the intervention over 50% faster than Sarah and Amy, suggesting that the time taken to complete the intervention may have an effect on any potential positive outcomes. Research by Miller et al. (2017) supports the claim that intervention duration has an effect on positive outcomes, suggesting that longer nutrition or health interventions are more successful than shorter interventions. Moreover, the greater positive effect of longer interventions has been found in children within educational psychology when investigating the effect of intervention duration on reading fluency in 7 – 8 year olds (Ross & Begeny, 2015). The fact Amy and Sarah completed the intervention over a longer period of time could explain their greater positive outcomes when compared with Michelle.

Thirdly, the participants had varying levels of self-efficacy, anxiety and performance before the intervention commenced. Amy presented with statistically moderate levels of overall self-efficacy and physiological/emotional states both in the 50th percentile, based on diagnostic figures presented in study three (see chapter six). Michelle's levels were low, her overall self-efficacy level was below the 5th percentile and her physiological/emotional states place in the 10th percentile. Sarah's levels were very low, her overall self-efficacy level was below the 5th percentile and her physiological/emotional states placed in the 5th percentile. The difference in starting levels may have effected the outcome levels, the results suggest that it may be potentially easier for someone with higher self-efficacy to improve further than for someone with lower self-efficacy to begin improvement. However, research investigating the effects of early empowerment on self-efficacy and health behaviours by Kashani et al. (2016) found results to the contrary and suggested that participants with the lower baseline self-efficacy levels saw greater improvement over the course of the intervention than their higher level counterparts. A similar effect of participants with

lower baseline self-efficacy experiencing the greatest levels of improvement has been found in exercise psychology (Tayama et al., 2012). It is important to note that the speculation around the effect of time, adherence and starting self-efficacy levels must be generalised with extreme caution as due to the nature of single case study research generalisation to the wider population is unadvised without further supporting enquiry.

The design of the study as a single case research study provided the study with several major strengths. The mixed methods approach provided not only comparable statistics such as self-efficacy level, anxiety level and performance rating, but also an in depth view of the perceived affects from many different perspectives (Adelman et al., 1980; Barker et al., 2011). The multiple perspectives of coach, parent and diver helped to combat the potential limitations of youth participants' ability to articulate their feelings and opinions, which was recognised in earlier studies (see chapter four). In addition, the diving specific nature of the intervention and associated measures (DIVE-SE) allowed for a more reliable insight into self-efficacy and performance in diving than would be possible with more general measures.

Nevertheless, as with any study there were limitations. The main limitation of the current study is not only the small number of participants but also the demographic spread. All participants were female, of the same age and ability level, which did not allow for a broader view of the effect of the intervention on different divers. There were several reasons for the lower number of participants than initially hoped. Due to the length of the study researchers struggled with access to a diving club for several months as it was sometimes seen as an inconvenience or disruption to normal training. In addition, the study struggled with commitment, as many divers started the initial stages of the study but dropped out due to the length and levels of commitment needed to complete the study. Moreover, the study was conducted in the spring months, which are important months for leading up to regional and national competition (ASA East Region, 2016; British Diving, 2016b), making some clubs unwilling to get involved due to fears the study would negatively affect the performance of their divers at important competitions.

The fear of negative effects speaks to the main problem for recruiting for studies investigating psychology in diving, which is due to a wider scepticism of

psychology within the community. During the process of the current programme of research several clubs refused to be involved in the studies due to the scepticism or in some cases outright distrust of sport psychology. Head coaches and diving club officials give reasons such as not believing in sport psychology or that it would mess with the children's minds. The level of cynicism towards sports psychology by some of the major gatekeepers of the diving community makes research progression very difficult, and is definitely a problem that needs addressing if there is any hope of progression in the field of psychology and the sport of diving.

9.5. Conclusion

The study aimed to increase performance and self-efficacy levels while reducing anxiety levels in divers through the use of an arousal re-appraisal intervention. Largely, the study was a success, with participants reporting at least one of the expected positive outcomes of the intervention. However, the limitations of the studies design make further research necessary before the intervention can be promoted to the wider diving community. Due to the small number of participants and the single case study design generalisation to the wider diving community is not possible. Further research should aim to validate the intervention on a much larger scale, using larger numbers of divers and a more representative sample across difference age groups, genders and ability levels. In addition, the study highlighted the potential affect of duration of the intervention on the potential positive effects. Further research could address this by testing the intervention across varying time frames to identify if the potential effects are accumulative or plateau after initial improvement. However, it is my concern that without addressing the wider scepticism of sport psychology within the diving community further research will always be marred by a lack of support for arguably necessary research into athlete performance and wellbeing in diving.

The main aims of the current programme of research were to gain a detailed understanding of self-efficacy within a diving context, develop a scale to accurately measure diving specific self-efficacy and to use self-efficacy as a method of performance enhancement in springboard and highboard diving. The current programme of research consisted of six separate studies that aimed to provide answers to the research questions outlined in the introduction chapter of this thesis. The programme of research presented here provides a journey from initial qualitative exploration to quantitative scale development culminating in the development of a performance enhancing self-efficacy intervention specifically designed for divers. Study one aimed to gain an initial explorative understanding of the use of self-efficacy within a competitive diving sample. Study two was used to check and reinforce the findings of study one by using a sample of ex-elite divers and a similar qualitative approach. The findings of studies one and two were used to develop and validity test a diving specific self-efficacy scale in study three. Followed by study four in which the scale was used with an international diving sample to determine the hierarchy of importance of the sources of self-efficacy to highlight the areas suitable for a targeted self-efficacy intervention, as well as determine any links between self-efficacy and diving ability. Study five aimed to investigate the self-efficacy performance relationship in competitive divers, to reinforce the findings of study four and to highlight a suitable sample for a targeted intervention. Finally study six aimed to use a single case study design to test a diving specific self-efficacy intervention and its effects on performance, self-efficacy and anxiety.

10.1. Discussion of findings

10.1.1. Study one.

Study one utilised focus groups of existing divers of a range of different ability levels and ages to determine the use and attitudes towards self-efficacy within diving. In line with the first hypothesis it was expected that self-efficacy would affect divers perceptions of their diving performance and skill acquisition, with a specific focus on physiological and emotional states. The findings of study one suggested that divers did draw on the sources of self-efficacy when developing their confidence and beliefs about their ability. The results of thematic analysis of the focus group transcripts highlighted 40 meaning units that were sorted into 12 themes that covered the four sources of self-

efficacy. Preparatory skills, memories and control were closely linked with mastery experience. Modelling and imagery were associated with vicarious experience. Family influence, coach influence, peer influence and competition were linked with social persuasion, and emotions, imaginary barriers and mood were associated with physiological and emotional states.

The discussions within the focus groups mainly centred on the effects of social support, physiological barriers and emotions. In addition, as the majority of the focus group discussion focused on only three of the five sources of self-efficacy the study raised the opinion that the importance of the sources of self-efficacy may differ from the order in which Bandura (1977) presents them. Within Bandura's (1977) model of self-efficacy it is posited that mastery experience is the most influential of the sources, followed by vicarious experience, social persuasion and finally physiological and affective states. In contrast, the qualitative findings of study one suggested that physiological states, emotional states and social persuasion may be more important in the development of diving specific self-efficacy beliefs than mastery or vicarious experience.

To combat the risk of researcher and interpretation bias an independent coder was utilised. The independent coder had no involvement in the study or research project as a whole, their job was to analyse the transcripts from a completely impartial position. The analysis and findings of both the primary researcher and the independent coder were compared to ensure reliability. An inter-observer agreement of 93% was achieved; the further 7% was discussed until a unanimous decision was reached. One major limitation of study one was the ability of younger divers to articulate their thoughts and feelings, mainly the participants between the ages of 13-15 years. There are several reasons posited for the lack of engagement demonstrated by several members of the focus group. As the focus groups were a range of different ability levels and ages it could be assumed that some members of the group may not have been comfortable discussing their concerns and shortcomings in front of higher level or more respected members of their diving team. Research by Adams and Cox (2008) suggested participants involved in focus groups may temper their opinions to fit with social norms and that stronger, more confident personalities may overpower or restrict the answers of more shy individuals. To combat this expected shyness or difficulty discussing certain

topics observational data was also collected and interpreted to allow for a further pool of information about the divers opinions and reactions that could not necessarily be so easily self-censored (Bailey, 1994; Cooper & Schindler, 2001). Moreover, the reluctance and difficulty with articulation seen in the 13 – 15 year old participants also highlights a potential age range in need of further understanding and support in relation to their developing self-efficacy beliefs.

The topics themselves appeared to present an issue for participants to articulate, more specifically imaginary barriers, all participants seemed to struggle to articulate in words what they felt was holding them back. This struggle could have been due to the age of the participant. Research by Aldridge and Wood (1997) suggests children may not possess the necessary vocabulary and understanding to articulate emotional constructs in the same way as adults, which could restrict their ability to answer certain questions relating to emotions beyond their comprehension. However the articulation difficulties could also have been due to the closeness to the situation, as many of the divers were still regularly experiencing psychological difficulties in their training it may have been more difficult to discuss without causing an emotional reaction. Research in relation to traumatic memories posits that many individuals often struggle to articulate how they feel in relation to recent traumatic situations (Van der Kolk, 1998).

10.1.2. Study two.

Study two aimed to build upon the findings of study one, as well as provide a more detailed insight into the effects of self-efficacy on perceived barriers and facilitators to performance by using a sample of retired elite divers. The findings of study two provided an answer to the second research question of the current programme of research: What are the perceived barriers and facilitators to diving performance? The sample of retired divers suggested four main barriers to performance in diving, which were: emotions, loss of control, poor coaching and physical sensations. These four barriers fit into four of the sources of self-efficacy: mastery experience, social persuasion, physiological states and emotional states (Bandura, 1977). Study two also found four potential facilitators to diving performance: preparatory skills, teammates, good coaching and learned skills, which also fit into the same four sources of self-efficacy. The findings of study two provided further support for the use of self-efficacy in

diving, as well as the assumption that physiological states, emotional states and social persuasion are potentially more important in a diving environment than mastery and vicarious experience (Feltz & Mugno, 1983; Pattinson, Cotterill & Leyland, 2017). In addition to producing a sufficient answer to the second research question, study two further supported the findings of study one. Both studies one and two provided initial qualitative support for the notion that the hierarchy of the sources of self-efficacy in diving may differ to other sports and situations. The potential for the effect of the environmental state to change the hierarchy of the sources of self-efficacy has been suggested in several different sporting studies covering a range of different sports (Machida, Ward & Vealey, 2012; Samson, 2014; Valiante & Morris, 2013).

The depth of the knowledge gained through in depth interviews was a major strength of study two, however any potential generalisation of the findings within study two is difficult due to the small sample size and subjective nature of semi-structured interviews as a data collection method. The study used semi-structured interviews to gain detailed insight into specific areas of the diving experience; interviews have been extensively used in similar studies within sport suggesting the suitability of a qualitative interview design for exploratory research in sport (Law, Cote & Ericsson, 2007; Samson, 2014; Valiante & Morris, 2013; White & Bennie, 2015).

The main focus of the current programme of research was on the effects of self-efficacy on youth divers, yet study two used a sample of adult divers. The use of youth divers within the current programme of research was mainly due to the demographics of diving as a sport. Diving is primarily a young persons sport, as most elite international divers are in their late teens to early twenties thus the focus of diving research needs to be on youth divers (British Diving, 2016a; FINA, 2017b). Participants were recruited from a sample of retired divers between the ages of 18 – 35 years. The use of adult divers was an attempt to combat the weaknesses in research design seen in study one. The adolescent divers involved in the focus groups used within study one struggled to articulate their feelings and emotions, specifically during the discussions around psychological barriers. Existing research suggests that traumatic memories are often associated with periods of dissociation and compartmentalisation, which make memory recollection very difficult (Malmo & Laidlaw, 2010), and that recollection of difficult memories is often easier after the individual is removed from the situation (Brown &

Schefflin, 1998). Findings relating to memory recollection suggest that ex-divers may be potentially more able to be critical and reflective about their diving experience due to no longer being immersed in the diving environment. Study two took advantage of the enhanced detail that older and ex-divers were able to give. Yet as the resulting studies were still aiming to recruit and use youth divers the findings of study two were compared closely with study one to draw parallels between a youth sample and older sample.

The diving specific and qualitative nature of studies one and two make comparison with existing academic research quite difficult, as there is little qualitative research in diving. Yet the findings of studies one and two do link closely with findings in sports with similar demands to diving, such as gymnastics (Chase, Magyar & Drake, 2005; White & Bennie, 2015) and parkour (Clegg & Butryn, 2012; Fernández-Río & Suarez, 2016). The themes identified in the first two studies of the current programme of research are mirrored in the literary non-fiction available in diving, such as divers autobiographies, biographies and blogs. Emotions, poor mental health, mental block, psychological barriers and social support are widely mentioned in diving texts (Barrow, 2017; Boudia & Ellsworth, 2016; Daley, 2012; Louganis & Marcus, 2006; Mitcham & Writer, 2012). Moreover, qualitative research in aquatic sport, using samples that include diving, has demonstrated the detrimental effect of disordered behaviours and negative thinking on athletes' performance and wellbeing (Marks, Mountjoy & Marcus, 2011; Melin et al., 2014), which further supports the premise that diving has a potentially negative impact on self-efficacy and performance.

10.1.3. Study three.

Study three used the findings of studies one and two highlighting the use of self-efficacy and the importance of certain sources, along with existing research and self-efficacy scales to develop a diving specific self-efficacy measure (DIVE-SE). The scale development process was based on established methods in existing research (Kitchings et al., 2011; Llwellyn et al., 2008; Pajares, Hartley & Valiante, 2001; Zelenak, 2010) along with Bandura's (2006) self-efficacy scale development guidelines. The different themes, barriers and facilitators highlighted in study one and two along with existing self-efficacy scales were used to develop an initial set of items. Several experts in the fields of diving and self-efficacy research reviewed the items to ensure the suitability in the terms of

academic research and diving specific terminology. After the reviewing process, the sample of items was then tested for convergent validity, discriminant validity, internal consistency and factor reliability. Following validity testing the scale was adapted and edited, finally producing a 26-item scale specifically designed to measure overall self-efficacy along with providing a score for the individual sources of self-efficacy. Due to the items that were removed during validity, reliability and factor analysis the decision was made to combine the scales measuring physiological and emotional states to provide a stronger result.

The sample used to validate the DIVE-SE scale was an international sample of the diving community from 16 different countries, however the large amount of variance across the sample could also be seen as a limitation. With the exception of the United Kingdom, the United States of America and Sweden the other countries only had a small number of participants, which could not accurately represent the diving community in that country. For example, only one diver from China was involved in the study, yet China is arguably the most successful country in the world for diving and has won more medals in international competition than any other country in the world. China have won 158 world championship medals between 1973 and 2017, where as Sweden, UK and USA combined have only won 53 medals in the same time frame (FINA, 2017b). The lack of divers from countries in which diving is a very important sport, such as China, Mexico and Russia, suggest that the sample may not be a true representation of the international diving community. The lack of interest in these countries could have been due to a language barrier creating a language bias (Choi & Pak, 2005), as the countries with the largest involvement in the study were mainly English speaking countries. A higher response rate of participant from non-English speaking countries could have been gained through offering a translated version of the DIVE-SE scale. Research into questionnaire responses in Sweden suggested that a translated scale increased the response rate of non-Swedish nationals by 10.3% (Moradi, Sidorchuk & Hallqvist, 2010). A reliable translation of a self-efficacy scale such as the DIVE-SE scale would require a bi-lingual translator to both translate the scale and ensure cultural suitability (McKay et al., 1996). In addition, further validity testing in the new language would be necessary to ensure all the items are still suitable, understood and valid. Under the time and financial constraints of the current programme of research a suitable translation of the scale ensuring there was no loss of validity was not possible,

but could offer a future avenue of study. In addition, offering a translated version of the DIVE-SE scale for use in countries such as China or Russian, where diving is very popular could increase the likelihood and possibility of research insight within these communities.

Moreover, the variance of participant age across the sample made testing the suitability of the DIVE-SE scale for youth and adolescent divers difficult. Study three recruited divers over the age of 12 years for safeguarding issues, in addition due to the level of vocabulary used within the scale it was felt younger divers may struggle. Yet there was no maximum age requirement placed on the study meaning there was a large spread of age due to the large response from the masters diving community (above the age of 25 years). Due to the minimum age limit placed on study three it was not possible to posit with any certainty if the DIVE-SE scale was valid for divers under the age of 12 years. To combat this weakness of study three later studies within the programme of research conducted further validity testing with different samples and validated the scale for use with divers as young as nine years of age. Study three addressed one of the main aims of the current programme of research by developing a diving specific self-efficacy scale, with the hope that the scale would be used in later studies to ensure comparability and ecological validity across future diving research.

The methodological approach used in study three was based on item development and validity testing processes used within existing scale development studies to ensure a suitable methodology and ultimately a rigorous and valid scale (Llewellyn et al., 2008; Vealey et al., 1998; Zelenak 2010). A 0 – 100 continuous rating scale was used, rather than the 0 – 100 incremental rating scale in increments of 10 suggested by Bandura (2007). Alternative literature suggests that a 0 – 100 continuous rating scale, in which any number between 0 and 100 is an acceptable response, allows for more variance between participants and allows a more accurate measurement of the participants responses (Pajares, Hartley & Valiante, 2001; Usher & Pajares, 2009). The results of the convergent validity and internal reliability tests were within the acceptable ranges to ensure a valid and reliable study (Sedgwick, 2012; Tavakol & Dennick, 2011). Unfortunately, during the analysis of the scale several items designed to test physiological states and emotional states were discarded due to unsatisfactory factor loadings or heteroscedasticity, resulting in the subscales measuring physiological

states and emotional states only containing three items. Due to the small number of items the two subscales were combined, which produced a stronger subscale but means the DIVE-SE scale cannot distinguish between physiological states and emotional states. As the qualitative findings of study one and two highlight the potential importance of physiological and emotion stimuli it is a limitation that the DIVE-SE scale cannot measure the sources independently. Despite the limitation of the scale, all the statistical tests suggest the DIVE-SE scale is a suitable and valid measure of overall self-efficacy and the sources of self-efficacy in divers.

10.1.4. Study four.

Study four used an international diving sample, with a wide range of ages, abilities and experience to identify a positive link between self-efficacy level and diving ability level. The study found that divers who competed at an age group or elite level had higher self-efficacy levels than their novice and skills ability level counterparts. The findings can be used to suggest an assumed causal relationship as a MANOVA analysis was used (Mertler & Reinhart, 2016), however it is not possible to suggest in which direction. Does higher self-efficacy levels cause diving success or do higher ability divers develop higher self-efficacy levels due to the demands of the sport? Proposing a link between diving ability level and self-efficacy level is consistent with the current body of research in different sports (Bruton et al., 2013; Gomez-Paloma, Rio & D'anna, 2014; Nam-Young, Jae-Hyeon & Ho, 2015). The findings of study four gave the first solid link between diving ability and self-efficacy, and provided support for the existing research investigating self-efficacy in diving (Feltz & Mugno, 1983; Slobounov et al., 1997). Another finding of study four was a gender difference in self-efficacy levels in diving; female divers demonstrated lower levels of self-efficacy than male divers. The sample was evenly distributed between male and female divers, suggesting the gender difference found was not due to skew or fault in the data analysis. Gender differences were not explored in the previous qualitative studies and the majority of literary non-fiction available in diving is produced by male divers, meaning it is difficult to comment on the cause of a gender difference in diving. Existing research in sport does suggest that male athletes are more likely to have higher self-efficacy and use self-efficacy enhancing skills such as self-talk more often than female athletes (Eccles et al., 1993; Hardy, Hall & Hardy, 2005).

During the data collection participants were offered eight different options to record their ability level: recreational, novice, skills, novice masters, age group, junior elite, senior, and full masters. Recreational, novice, skills and novice masters divers were categorised as low ability as it is rare for divers to be permitted to perform dives above a 2.0-degree of difficulty in a competition setting (ASA East Region, 2016; FINA, 2017a), which restricts their diving to simple, lower level skills. Age group, junior elite, senior and full masters divers are permitted and often required to perform more difficult skills with a much higher demand on degree of difficulty and variety of dives (British Diving, 2016; FINA, 2017a). One area of concern in regard to the research findings of study four is the rigor of the sample as a true representation of the international diving community. Similarly to study three, the spread of nationalities amongst the participant was not fully representative of the diving community, partly due to language restrictions mentioned above. Moreover, the findings of study four are reliant on the accurate reporting of diving ability level by the participants involved. However, the options given for the reporting of ability level were based on the UK competitive diving system. Competitive systems and ability rankings differ widely between countries. Sweden and the USA were two countries with high response rates. In Sweden their competitive ability rating is based on a letter system from Class A to Class F (Svensk Simdrott, 2017), whereas the USA bases their competitive system on locality of the completion: regional, state, collegiate, national (USA Diving, 2017b). This apparent difference between the rating of ability levels between countries could have caused participants to inaccurately report their ability level, in turn affecting the overall outcome of the study. Further research could confirm the accuracy of study four by replicating the study with a more universal measure of ability level that would be applicable across nationalities. One option would be for participants to categorise their ability based on the level of dive difficulty they are able to perform based on the FINA degree of difficulty categorisations, which is a universal numerical system used in diving worldwide (FINA, 2017a).

Study four also provided the quantitative support for the proposal of a different hierarchy of importance for the sources of self-efficacy in a diving specific environment. The results of study four, along with findings of study one and two suggested the hierarchy of the sources of self-efficacy in diving should be: social persuasion, physiological and emotional states, mastery experience then vicarious experience. The results of study four found a statistically significant link between diving ability level and

social persuasion, as well as diving ability level and physiological and emotional states. Mastery experience and vicarious experience were not significant. Moreover, social persuasion demonstrated the strongest statistical link to diving ability level suggesting it would potentially be the strongest predictor of diving performance. Vicarious experience demonstrated the weakest link to diving ability level suggesting it would potentially be the weakest predictor of diving performance. Furthermore, the findings of study four provided partial support for the third hypothesis of the current programme of research, which stated physiological and emotional states will be the most important source of self-efficacy in diving. Although social persuasion appeared to be the most influential source of self-efficacy on divers, physiological and emotional states was rated more important than mastery experience and vicarious experience.

The hierarchy discovered in study four differed to Bandura's (1977) original model, which states mastery experience is the most influential source of self-efficacy followed by vicarious experience, social persuasion and finally physiological and affective states (Bandura, 1977; Warner et al., 2014). Several studies within sport have posited that certain sources of self-efficacy might be more important in specific sports than others. A study by Samson (2014) in competitive marathon running posited that physiological and emotional states were perceived as the most influential sources of self-efficacy, followed by social persuasion, mastery experience and finally vicarious experience. Whereas an investigation by Valiante and Morris (2013) into the sources of self-efficacy in mid handicap golfers reported mastery experiences to be perceived as the most influential source of self-efficacy followed by social persuasion, with physiological states, emotional states and vicarious experience only being mentioned sporadically. Moreover, a study by Machida, Ward and Vealey (2012) of 13 different sports (basketball, diving, field hockey, American football, golf, ice hockey, ice skating, European football, softball, swimming, tennis, athletics and volleyball) proposed that mastery experience was the most influential source, followed by physiological and emotional states, social persuasion and finally vicarious experience. Despite several studies presenting different hierarchies for the sources of self-efficacy, vicarious experience is consistently seen as the least influential source of self-efficacy. The findings of study four also found vicarious experience to be the least influential source of self-efficacy in diving.

It could also be argued that the hierarchy in the studies differs due to theoretical or methodological differences. The study by Machida, Ward and Vealey (2012) used the theory of sports confidence, which encompasses aspects of self-efficacy but also measures other variables that are extraneous to self-efficacy theory, which could have affected the research outcomes. Whereas, research by Samson (2012) and Valiante and Morris (2013) both use a qualitative methodology, which differs from the quantitative methodology used in study four. However the findings from study four are consistent with the qualitative findings of studies one and two that highlighted social persuasion and physiological and emotional states were perceived as the more influential sources of self-efficacy. Consequently, the consistencies between the findings of study one, two and four suggest that the hierarchy of the sources of self-efficacy in diving differs from the hierarchy presented by Bandura (1977) and the hierarchy seen in other sports (Machida, Ward & Vealey, 2012; Valiante & Morris, 2013).

Study four used a cross-sectional quasi-experimental design and the quantitative data collection technique of questionnaires, followed by MANOVA analysis to explore the relationship between self-efficacy and ability level in diving. Using questionnaires to collect information across large samples is a popular and cost effective method of gaining large amounts of participants in short time frames (Pattern, 2016). Arguably questionnaires do not provide as much of a detailed insight as interviews or focus groups. However, due to the in-depth rigorous methodological approach used to the development of the DIVE-SE scale the findings of any subsequent studies using the scale are inherently strong as long as the scale has been used suitably and adhered to the associated guidelines. In addition, the data analysis technique of MANOVA is strong and appropriate for an experimental design (Warne, 2010). The findings of study four provide quantitative support for the qualitative findings of studies one and two, and further support the premise that mastery experience may not be the most influential source of self-efficacy in all situations. Finding that social persuasion and physiological and emotional states appear to be more influential than mastery experience and vicarious experience provided further information for the design of future diving specific self-efficacy interventions.

10.1.5. Study five.

Study five aimed to establish if self-efficacy could predict competition performance in a sample of divers from the British National Age Group Championships in 2016. The study was conducted at the British National Age Group Championships 2016 due to the time of year the study took place, as well as the difficulty gaining access to a high number of higher-level divers within a training environment. A more detailed discussion about the difficulty gaining access to higher-level divers due to the opinions and scepticism of certain gatekeepers within the diving community will feature later in this chapter. A total of 38 divers from an initial sample of 56 divers completed the DIVE-SE scale 2 hours prior to their event to give a score of the divers self-efficacy. Divers competition performance was measured by recording their total performance in their event; the information was accessed through the online scorekeeping software DiveRecorder™.

Initial analysis was run to validate the DIVE-SE scale for use with younger divers, and the findings suggested the scale was suitable for use with divers as young as nine years old. Running further validity analysis on the DIVE-SE scale combated a weakness highlighted in study three, in which the scale was only validated for divers as young as 12 years. The findings of study five could not provide further support for the third hypothesis of the current programme of research as there was no significant relationship found between total competition score and the sources of self-efficacy. Finding no significant relationship made assumptions about the hierarchy of the sources of self-efficacy within the sample unreliable.

The findings of the regression analysis used to establish if self-efficacy level was a predictor of competition performance was less conclusive. Self-efficacy was found to be a predictor of competition performance, but only in one specific age group, 12 – 13 year olds. The findings of study five provided limited support for the fourth hypothesis, which expected to find that divers with higher levels of self-efficacy will achieve better performance outcomes than divers with lower levels of self-efficacy. One potential explanation for the lack of reliable results could be limitations in the studies design. The competition performance measure used was total competition score at the British National Age Groups Championships 2016, which may not have given a true representation of the level of performance for that specific diver. For example, a diver

may have placed 22nd out for 30 divers with a score of 201 points but have executed a personal best performance, whereas another diver may have placed 3rd with a score of 350 points but performed very poorly for their ability. Measuring performance based on competition score does not take into account the individual differences of the each divers ability. Using a more in depth measure of performance, such as a triangulation between competition score, coach performance rating and diver performance rating could attempt to address the limitations of study five.

The aim of study five was to establish if self-efficacy levels could predict performance in age group divers. The lack of conclusive findings was not expected; existing research supports a strong relationship between self-efficacy and performance in other sports (Bruton et al., 2013; Di Corrado et al., 2015; Hayes et al., 2006; Horn, Williams & Scott, 2002; see Stizmann & Ely, 2011 for review). In addition, research in sports similar to diving, such as gymnastics and dance has also shown a relationship between self-efficacy and performance (Gomez-Paloma, Rio & D'anna, 2014; Nam-Young, Jae-Hyeon & Ho, 2015). In Gomez-Paloma, Rio and D'anna (2014) a positive effect of gymnastics on perceived physical ability was seen in both recreational and competitive gymnasts, and they posited it was in the higher self-efficacy levels in competitive gymnasts could be due to the psychological demands of the sport and that the sport of gymnastics may not suitable for young girls with low self-efficacy levels. The suggestion that the physical and psychological demands of the sport could affect self-efficacy levels could possibly be applied to diving as well.

One possible explanation for only finding a relationship within group C (12 – 13 years) was that group C is the optimum age to be diving age group level based on the British Diving long term athlete development plan (British Diving, 2005), which could explain the lack of findings in younger and older divers. Divers in group D (10 – 11 years) at age group level are more advanced than expected, suggesting they are still developing their diving, and divers in older age groups B (14 – 16 years) and A (17 – 18 years) should be at junior or senior elite suggesting there are certain factors slowing or halting their progression. Further investigation into the self-efficacy performance relationship within skills, junior elite and senior levels could provide further support for this hypothesis.

When taking into account methodological rigor study five was not as strong as some of the previous studies in the current programme of research. As previously mentioned the performance measure used within the study was competition score. Using competition score as a measure of performance does not allow for the measurement of the performance relative to the individuals ability. In a study of golf by Bruton et al. (2013) handicap was used as one measure of performance ability, which is much more encompassing of individuals ability than overall competition score. However, there is no handicap system in diving. Using competition score in relation to the athletes' personal best score may give a better picture of individual performance. Alternatively, performance ratings from coaching staff or even an impartial judge may give a more reliable measure of individual performance. As the methodology and data collection has a level of weakness it calls into question the validity of the study. It is advisable to treat the findings of study five with caution and a replication of the study with a stronger performance measure and wider participant group is recommended.

10.1.6. Study six.

Study six aimed to use an arousal re-appraisal intervention to enhance self-efficacy and performance and reduce anxiety in divers. An explanatory multiple case study design with three age group divers was used to gain in depth insight into the impacts and opinions on the intervention. The data analysis approach used theoretical propositions, meaning self-efficacy and performance theory guided the design, interpretation and analysis of the data collected. Explanation building was used as the main analytical technique to provide an explanation of the case and identify potential causal links between the effects of the intervention and behaviour/performance outcomes. Pattern matching was used as the secondary analytical technique, in which data was compared with expected outcomes and rival explanations. The methodological approach for study six was based on existing recommendations to ensure suitable methodological rigour (Barker et al, 2011; Yin, 2013).

All three divers reported an improvement in performance and self-efficacy level and a reduction in anxiety levels during training. The effects reported varied between divers, it was theorised that the levels of adherence, duration of intervention or initial self-efficacy levels could have explained the variance between divers. The findings of study six provide support for the fifth hypothesis of the current programme of research:

the implementation of an arousal re-appraisal intervention into a training environment will improve training performance and self-efficacy levels whilst reducing anxiety towards new and complex skills. Generalisation from study six is difficult due to the multiple case study design, so to establish if the intervention has a positive effect and to answer the questions raised it is necessary to test the intervention on a larger sample before any truly reliable suggestions for practical applications can be made.

The findings of study six were in line with the limited research in the area of arousal re-appraisal and performance enhancement. A study by Beltzer et al. (2014) found a marginal increase in performance and a reduction in anxiety on a digital driving task following arousal re-appraisal, when compared with a control group. Within the sporting domain, research by Puig and Pummell (2012) found a reduction in anxiety and increase in performance following a cognitive re-appraisal intervention in a single case study of a youth tennis player. Cognitive re-appraisal differs slightly from arousal re-appraisal. Arousal re-appraisal focuses more in the control and re-appraisal of physiological and emotional stimuli whereas cognitive re-appraisal focuses on the re-appraisal of emotions (Gross, 2002). Moreover, a positive effect of a cognitive re-appraisal intervention on performance and anxiety reduction was seen in a single case study of a professional rugby union player (Edwards & Edwards, 2016). The previous research suggested that study six should find an improvement in performance and a reduction in anxiety following the arousal re-appraisal intervention. The findings of study six were consistent with the expectations and the findings of previous research. Methodologically study six was based on existing studies (Beltzer et al., 2014; Greenberger & Padesky, 1995; Kim & Hamann, 2012; Puig & Pummell, 2012) as well as recommendations from leading texts in case study research design (Barker et al., 2011; Yin, 2013) ensuring a high level of academic rigor.

10.2. Methodological Reflections

The current programme of research utilised pragmatic philosophical underpinnings for the research design and data interpretation. Using a pragmatic paradigm allowed for a much more holistic, real-world research approach than was possible using other paradigms such as positivism or constructivism. A pragmatic paradigm posits that the best way to understand knowledge is to use the best method for solving the problem (Giacobbi, Poczwardowski & Hager, 2005), it is this problem

solving focus that makes pragmatism a popular philosophical approach for research in sport and exercise psychology (Llewellyn & Sanchez, 2008; Samson, 2012). On reflection, using pragmatic philosophical underpinnings provided the current programme of research a strong foundation, yet allowing sufficient flexibility for the research design to evolve and adapt based on the findings at each stage, which other paradigms may not have been able to accommodate.

A sequential exploratory mixed methods approach (Creswell, Fetters & Ivankova, 2004; Rauscher & Greenfield, 2009; Tashakkori & Creswell, 2007) was used within the current programme of research. The research journey began with qualitative exploration to increase the knowledge and understanding of a diving subculture, followed by the design and development of a measurement tool to allow for the quantitative exploration of the links between self-efficacy and performance. Finally the two methodologies were combined in a final study using multiple case studies to apply the findings of the previous research to a diving specific self-efficacy intervention. A mixed methods approach was desirable because of seven major advantages: completeness, strengthening potential weaknesses, triangulation, informing future sampling, enhancing generalisation, hypothesis development and instrument development (Doyle, Brady & Byrne, 2009; Greene, Caracelli & Graham, 1989; Hagger & Chatsisarantis, 2011; Hesse-Beber, 2010). The ability of a mixed methods approach to simultaneously investigate both exploratory and confirmatory research questions (Tashakkori & Teddlie, 2003) lent itself to the niche nature of diving research. As there were only a small number of research studies pertaining to diving psychology (Bell, Finch & Whitaker, 2010; Highlen & Bennett, 1983; Huber, 2016; McGregor & Abramhamson, 2000; Post et al., 2014), and fewer still investigating self-efficacy in relation to diving (Feltz & Mugno, 1983; Rymal, 2007; Slobounov et al., 1997) it was necessary that any imposed methodological constructs allow for exploration. Thus the use of both qualitative and quantitative research designs within the same programme of research allowed for exploratory research to enhance knowledge as well as the ability to confirm and triangulate findings for additional reliability. On reflection, the use of multiple data collection and analysis approaches across both the qualitative and quantitative research domains allowed the current programme of research to provide a strong, detailed, in depth view of self-efficacy within a diving context as well as real-world applications that can be implemented by coaches and athletes.

10.3. Research implications

The findings presented in this programme of research mark the first in depth investigation into the performance enhancing properties of self-efficacy in diving. The importance of detailed knowledge of self-efficacy within diving is necessary for the progression of the sport. The development of a diagnostic measure and a diving specific intervention provides the first steps towards changing the way sport psychology and more specifically self-efficacy is used within diving. This research is essential when trying to combat the scepticism and mistrust of psychology and mental health within the diving community. One of the main limitations of this programme of research as a whole was the recruitment of participants; it was an on-going struggle due to the lack of knowledge, scepticism and distain towards sports psychology within the diving community. Several times throughout the study entire diving clubs and diving communities were denied access to the studies due to the opinions of their head coach or other gatekeepers. Despite the individual divers and parents wish to participate several clubs elected to not participate on the grounds of not believing in psychology or believing that sport psychology was unsafe for children. The lack of education about the processes and positive impacts of correctly used sports psychology is worrying, and is an area in much need of addressing. The hope is that with further publicity of research about the positive impacts of sports psychology within diving these gatekeepers will become more receptive and allow their divers available opportunities to engage with sport psychology research. However, to truly address the lack of knowledge and mistrust of sport psychology the governing body of diving may need to step in and provide the suitable education to allow the sport to progress.

Several generalisations can be made from the findings of the current programme of research. Firstly, Self-efficacy is used within diving and can have an effect on diving performance. Secondly, the hierarchy of the sources of self-efficacy appears to differ from the model presented by Bandura (1977). Thirdly, the findings of the current programme of research highlight the use of self-efficacy as a potential performance enhancement, which could be utilised by divers and coaches within their training. Finally, the targeting the effect of physiological and emotional states could be more beneficial than more traditional mastery and vicarious experience based interventions due to the apparent importance of physiological and emotional stimuli in diving. Also

the development of the DIVE-SE scale can allow for further research to be more reliable, diving specific and comparable. Overall, the implementation of better education about self-efficacy and self-efficacy skills training for coaches, parents and divers could positively influence the quality of the divers our countries diving programmes could produce.

Irrespective of the detail and rigor of any research study there will always be unanswered questions, and the current programme of research is no exception. Due to the inconsistencies in the findings of study five, several questions are left unanswered about the self-efficacy performance relationship in diving. Study five only found an effect in group C age group divers (12 – 13 years), leaving the question does self-efficacy predict performance in other ability levels of diving?. In addition, it was hypothesised that the reason there was only an effect found in group C was that this is the optimum age for a diver to be at age group standard. Raising the question, does the self-efficacy performance relationship link with the optimum age for other ability levels, if so it would be expected to find an that self-efficacy predicted performance in group D at skills level (10 – 11 years) and group B at junior elite level (14 – 16 years) and group A at senior level (17+ years). Moreover, study six also presented with an unanswerable question, due to the small sample size it was impossible to know if an arousal re-appraisal intervention would have a positive effect on performance and reduce anxiety in a larger more diverse sample. It is the hope that further research will be able to answer these questions.

11.1. Restatement of the Research Aims

The main aim of this programme of research was to explore the uses of, and opinions towards, self-efficacy in diving; adopting a pragmatic mixed methods approach. A qualitative methodology was employed to explore the experiences, opinions, and attitudes towards self-efficacy, diving performance and any associated barriers and facilitators. Building upon these findings a quantitative methodology was used to provide insight into the self-efficacy performance relationship and to develop a hierarchy of sources of self-efficacy within a diving sample. A multiple case research study design was used to investigate the potential performance enhancing properties of a diving specific self-efficacy intervention. Also, the current study aimed to develop a diving specific self-efficacy measurement tool to allow for comparability between research studies and diagnostic capabilities within applied interventions.

Three major outcomes were expected from the current programme of research. Firstly, the current research aimed to provide a boarder understanding of self-efficacy, performance and psychological pressures in a diving setting, as well as providing insight into the personal experiences of current and ex-divers. Secondly, the current research aimed to develop a suitable and valid diving specific self-efficacy scale to enhance transferability, comparability and ecological validity across diving research. Thirdly, the current research aimed to pilot a diving specific self-efficacy intervention in an applied setting to enhance performance and reduce anxiety in competitive divers.

11.2. Summary of Key Findings

The first key findings presented in the current thesis was that the majority of participant involved in the focus groups mentioned the debilitating effects of their emotions and physical manifestations of fear on their diving progression and performance. The findings of study one highlighted that the divers used elements of self-efficacy within their normal training but were often not utilising all of the different sources of self-efficacy successfully. These findings were further supported by the opinions expressed by a sample of retired divers in study two. Qualitative findings from these initial studies highlighted participant's feelings about the negative effects of physiological and emotional states as well as the influence of social persuasion on their

attitudes towards new and more difficult dives. These first two studies provided evidence with which to answer the first main thesis research question; confirming the findings of existing research that self-efficacy and self-efficacy based skills are used in diving.

The second key finding of the current programme of research was the ability to accurately measure self-efficacy within diving. Prior to the current programme of research studies investigating self-efficacy in diving used generic measures of self-efficacy calling into question the robusticity of the findings. Study three developed and validity tested a diving specific self-efficacy measure which proved valid and reliable for divers 12 years and over, and with additional validity testing in study five the measure was deemed suitable for divers as young as 9 years old. The development of a diving specific self-efficacy measure can not only provide a level of ecological validity and comparability to future diving research but can also provide coaches and applied professionals in diving with a reliable diagnostic tool for self-efficacy levels.

The third key finding of the current programme of research was that the sources of self-efficacy within diving might not follow the same model highlighted by Bandura (1977). Within studies one and two the qualitative findings of semi-structured interviews and focus groups with current and retired divers suggested that the effects of physiological and emotional states were influential on a divers perceptions of their diving ability. The findings of study four built on the initial findings of studies one and two using a qualitative methodology. Study four used an international sample of divers from 16 countries to discover if there was a diving specific hierarchy of the sources of self-efficacy. Using the DIVE-SE scale developed in study three, study four found that there was a different hierarchy of the sources of self-efficacy within diving: social persuasion, physiological/emotional states, mastery experience then vicarious experience. These findings differed slightly from those of the first two qualitative studies, in which participants mentioned at length the effects of physiological and emotional stimuli on their progression and performance. However, finding a different order of the sources of self-efficacy can inform the development of future interventions and training programmes, ensuring that self-efficacy skills and interventions are targeting the areas of most need.

The fourth key finding of the current programme of research was the relationship between self-efficacy and performance. Within study four a link between diving ability level and self-efficacy level in diving was found. The findings of study four suggested that higher ability divers have higher self-efficacy levels than their lower ability counterparts, which begins to provide an answer to the third research question. Building on the findings of study four, study five aimed to investigate the self-efficacy performance relationship in diving. The findings of the study were less conclusive than expected. Self-efficacy was found to predict performance but only in group C (12 – 13 years) divers, one reason for this finding was that group C is the optimum age for an age group diver based on the British Diving long term athlete development plan. However, without further research to investigate if the self-efficacy performance relationship follows the diving LTAD expectations this is simply a hypothesis.

The fifth key finding presented in the current thesis is the performance enhancing and anxiety reducing capabilities of a diving specific arousal re-appraisal intervention on adolescent divers. Study six involved the development and piloting of an arousal re-appraisal intervention which resulted in an improvement in performance and self-efficacy levels as well as a reduction in anxiety levels using a multiple case research design. Due to the problems with recruitment and an overall scepticism towards sports psychology within the diving community study six utilised a single case study design. Three group B (14 -16 years) divers undertook an arousal re-appraisal intervention as part of their regular training. Using both qualitative and quantitative methods an improvement was seen in performance, self-efficacy and anxiety reduction, suggesting that addressing physiological and emotional stimuli within diving can improve performance, providing an answer to the fourth research question presented in the current programme of research. Obviously, due to the use of a single case study design generalisation is not advised and future research should aim to test the intervention on a larger scale before any practical application can take place.

Overall the current programme of research has provided a detailed insight into the diving community. Whilst answering some questions related to self-efficacy and diving the current research has raised more questions, which hopefully with additional research will further enhance understanding of self-efficacy in diving.

11.3. Practical guidelines for Diving Performance Enhancement

What became apparent through the current programme of research is that each diver has very different experiences and is influenced by different stimuli. However, that said certain antecedents and types of self-efficacy appeared to be fairly consistent across the studies including: social support; and emotional and psychological barriers.

11.3.1. Social support. One area of self-efficacy that was consistently mentioned through the current programme of research was the effect of a divers social support system. During the qualitative investigations both current and retired divers regularly mentioned the positive influence of supportive parents, peers and coaching staff, along with the detrimental effects of negative coaching styles, peer rivalries and pushy parents. The effect of social influences was also apparent in quantitative findings included in the current programme of research. Social persuasion was seen as the most influential source of self-efficacy beliefs in an international sample of divers. Coaching staff, parents and other social support systems around a diver should therefore endeavour to foster a positive environment in which the diver feels comfortable and encouraged. Negative practises such as inflictive punishments, belittling feedback, peer rivalries and parental pressure should be avoided. Providing information and education to parents, coaches and athletes on the potential debilitating effects of negative social interactions on diving performance could make the first steps to providing a more stable and supportive social environment for a diver. Additionally, the introduction of behaviour charters for parents and coaches as well as athletes could allow for all areas of a divers support system to know their role within the divers development. A behaviour charter is a set of rules outlining the role and expectations of each member of the divers support system, which could potentially reduce negative practises such as parent's coaching their children, which can undermine coaching staff.

11.3.2. Emotional and psychological barriers. Throughout the current programme of research the influence of emotions and psychological barriers on diving performance became very apparent. In studies one and two current and retired divers highlighted the impact their emotions and perceived barriers had on their performance, diving progression and skill acquisition. In addition, many divers mentioned invisible or imaginary barriers and the associated detrimental effect on performance and self-

efficacy. Coaches should be aware of the emotional needs of divers, ensuring that equal standing is given to the mental and physical preparation for new and complex skills. Specific time and training should be provided to assist divers to psychologically prepare for diving, just as specific time and training is provided for physical aspects of diving, such as strength and conditioning. Emotions such as frustration or fear appear to have a crippling effect on divers progression, possibly even more so than memories of physical injury. Special attention needs to be given to divers physiological well-being, ensuring a diver is able to process and vocalise their emotions and psychological pressures will give coaching staff, sport psychologists and other support systems the ability to provide appropriate support or psychological skills. It is likely that perceptions towards psychological well-being and psychological interventions within diving will only change with access to information and education for those involved. Increasing the awareness and understanding of sport psychology and diving based psychological interventions could help to combat the scepticism and mistrust of psychology within the diving community. This in turn could provide a stronger platform for the promotion and use of diving based psychological interventions to increase self-efficacy belief based on physiological and emotional states.

11.3.3. General recommendations. A general awareness of the influences on a divers performance will allow coaching staff the greatest stance to improve and enhance a divers performance. Monitoring the influences of social interactions, emotions, physiological pressures, past experience and vicarious experience will give coaching staff a well rounded picture of where a diver draws their confidence and self-efficacy beliefs from, allowing for enhancement of associated self-efficacy beliefs. For example, if a diver is very externally gratified and puts great stock in others opinions, then coaching staff will have to closely monitor the feedback the diver is receiving from all areas of their social environment to ensure a positive environment for the diver. The use of the DIVE-SE scale as a diagnostic tool could give coaches and team managers a better idea of which source of self-efficacy their divers are more influenced by, thus allowing for monitoring and adaptations to training programmes to ensure the most positive environments and performance enhancement for their divers.

11.4. Future Research Recommendations

The current programme of research focused on the self-efficacy performance relationship in age group divers due to the availability and access allowed to diving competitors. Study five reported that self-efficacy levels predicted performance in group C (12 – 13 year old) age group divers. It was hypothesised finding an effect in group C was due to 12 – 13 years being the optimum age for a diver to be competing at age group level based on the British Diving LTAD programme. If this is the case, it would be expected to find a predictive effect of self-efficacy on performance in group D (10 – 11 years old) at skills level and group B (14 – 16 years old) at junior elite level. Future research should aim to test this hypothesis by repeating the design of study three using different levels of diver.

In addition, study six of the current programme of research piloted a diving specific self-efficacy intervention using arousal re-appraisal. The use of a multiple case research design provided detailed insight into the effect and opinions towards the intervention. However, there is little transferability to the wider diving community. Future research should aim to test the arousal re-appraisal intervention on a larger scale to determine its suitability as a performance enhancement tool in diving.

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DIVE-SE scale**Section 1**

Rate your confidence in your current diving ability in relation to the following statements.

Use any number from 1 (not at all confident) to 100 (extremely confident).

My confidence in my ability to:

Keep my concentration	
Control my fear	
Prepare my body for hard dives	
Dive well	
Avoid making mistakes	
Prepare my mind for hard dives	
Achieve what I set out to do	
Use correct diving technique	

Section 2

Please indicate how much you agree with the following statements based on your current diving ability.

Use any number between 1 (strongly disagree) to 100 (strongly agree).

1) I have positive experiences from past diving sessions.	
2) I have improved my diving skills by watching professional divers I admire perform well.	
3) My teammates think I am a good diver.	
4) I do not worry about mistakes when diving	
5) I have had positive experiences performing simple dives.	
6) I have improved my diving skills by watching divers at my level perform well.	
7) Members of my family believe I dive well.	
8) I have had positive experiences performing complicated dives.	
9) Observing my teammates helps me learn new dives.	
10) My coach has complimented me on my ability to dive	
11) Diving makes me feel upset.	
12) I have overcome diving challenges through hard work and practice.	
13) I have watched other divers try a new dive and then decide if I could try the same dive.	

14) I have received positive feedback about my dives from divers outside of my club.	
15) I often feel like I can't move when preparing to dive.	
16) I have met or exceeded other people's expectations for a diver of my age.	

DIVE-SE Scale Scoring Key

Section 1: All items are added together then divided by eight to gain an average score for the section.

	Diver level	Percentiles						
		5	10	25	50	75	90	95
Overall	Low	35.00	35.63	49.06	61.25	67.50	76.45	85.44
Self-Efficacy	High	46.49	49.81	58.75	70.94	79.22	88.61	92.66

Section 2: Items 11 and 15 are reverse scored. Items from each subscale are added and divided by the amount of items in the subscale to produce an average for each source of self-efficacy.

Mastery Experience – items 1, 5, 8, 12

Vicarious Experience – items 2, 6, 9, 13

Social Persuasion – items 3, 7, 10, 14, 16

Physiological and Emotional States – items 4, 11, 15

	Diver level	Percentiles						
		5	10	25	50	75	90	95
Mastery Experience	Low	55.63	63.00	70.00	80.00	93.13	99.30	100.00
	High	63.56	65.00	73.75	83.75	93.75	99.83	100.00
Vicarious Experience	Low	38.00	40.20	50.00	61.00	66.50	75.80	79.70
	High	27.57	35.70	47.00	56.00	66.80	78.00	80.00
Social Persuasion	Low	20.98	26.48	47.80	59.20	75.00	83.60	94.50
	High	47.53	53.40	66.00	76.50	89.75	96.00	98.81
Physiological/Emotional States	Low	20.03	24.27	40.00	63.33	78.17	88.13	96.40
	High	39.50	46.67	60.00	73.33	86.25	93.73	99.05

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This appendix details the audit trail for study 1 - A qualitative investigation into self-efficacy in a diving context. The contents of this audit trail are detailed below:

1. Details of focus groups
2. Participant profiles
3. Transcripts of focus groups
4. Observational notes
5. Sources of self-efficacy with raw data examples
6. Professional profiles
7. Participant Screening Information
8. Recruitment Email
9. Participant information Pack

Details of Focus Groups

	Focus Group 1	Focus Group 2
Duration	36 mins	32 mins
Location	Aquatics Centre Meeting Room 1	Aquatics Centre Meeting Room 1
No. of Participants	6	6
Gender	2 male 4 female	3 male 3 female
Mean Age	23 years	14 years
Level of Diver	2 regional 4 national	3 regional 3 national
Ability of Diver	2 masters 1 skills 1 age groups 2 seniors	2 novice 2 skills 2 age groups

Participant Profiles

Jane

Jane is a masters diver, aged 40 years; she came to diving aged 37 because her children are competitive divers. She is currently at a competitive level, competing in the Full Masters 40 – 49 years age group. She holds several regional and national titles in this age bracket. Jane expressed feeling a small amount of anxiety when learning new dives but high levels of anxiety during competition. Jane attended focus group one, she felt comfortable discussing her experiences and took the lead in most of the discussions held within her focus group, but was also very nurturing and encouraged other participants to voice their opinions by complimenting their skills and experience.

Ian

Ian is a masters diver, aged 39 years, and is relatively new to the sport of diving. He came to diving due to other members of his family being involved in the sport. He has been diving for just over one year but has achieved a competitive standard in this short amount of time. He has competed a Novice Masters level in the 30 – 39 years age group at the Great British Spring Masters in 2015. He currently holds no regional or national titles. Ian expressed a sufficient level of anxiety during training to affect his

ability to learn new dives, as well as a small amount of competition anxiety. Ian was involved in focus group one and took a secondary role during the majority of the discussion but made some interesting points.

Ruth

Ruth is a novice diver aged 16 years; she has been diving for 7 years. She has competed at a regional novice level but due to extreme nature of her anxiety during training and competition she has been unable to move forward with her diving for many years. Despite this she still attends sessions multiple times a week to attempt to overcome her anxieties but often leaves sessions in tears. Ruth was part of focus group two, she was quite nervous during the discussion but put forward several interesting comments.

Mary

Mary is a skills diver, aged 14 years, she is relatively new to diving and came to diving at a later than average age. She began diving when she was 12 years old but quickly progressed through to competitive standard. She has competed at regional novice and skills level, but due to crippling competition anxieties she does not compete very often and currently hold no titles. Her anxieties during training are not as much of a problem and she progresses quite steadily through her programme, however certain dives have provided her a higher level of anxiety than others. Mary was involved in focus group one; she was very reserved and did not participate in the discussion. This may have been due to her status as one of the newer members of the club, she may not have felt comfortable expressing her anxieties in front of the more senior members of her team.

Rose

Rose is a senior diver, aged 17 years, and has been diving for 8 years. She has competed at regional and national skills, age group and senior level for several years, accumulating a collection of regional and national titles. Rose does experience anxiety during training and it has hampered her ability to progress to higher level diving. She does not seem to struggle with competition anxiety but this could easily be due to her expensive competition experience. Rose was involved in focus group one and took a leading role in several of the discussions, as a more senior member of the team she was comfortable voicing her opinions and her insecurities.

Fern

Fern is a senior diver, aged 17 years, she has been diving for eight years. She has competed at regional and national skills, age group and senior level for several years, accumulating a collection of regional and national titles. Fern experiences minimal anxieties during competitions and training but this can be put down to her extensive experience. She has experienced anxieties with certain dives but seems to successfully overcome these problems with ease. Fern was involved in focus group one and took a leading role in several of the discussions, as a more senior member of the team she was comfortable voicing her opinions and her insecurities.

Dylan

Dylan is an age group diver, aged 13 years. He has been diving for three years. Dylan was first identified for diving through a talent identification programme run through his school, this was a two fast track programme designed to nurture natural talent in children with limited diving experience. Following this programme he has competed at regional and national level in skills and age groups, and has recently began to perform in open categories with adult divers. He has held several regional titles. Dylan suffers with severe anxiety in relation to new dives, training and competition; this drastically affects his diving ability and enjoyment. Dylan was involved in focus group one and was comfortable discussing his anxieties and issues.

Daisy

Daisy is an age group diver, aged 13 years. She has been diving for four years. Daisy was also identified for diving through a talent identification programme run through her school. Following this programme she has competed at regional and national level in skills and age groups, and has recently began to perform in open categories with adult divers. She has held multiple regional and national titles. Daisy suffers with severe anxiety in relation to new dives, training and competition; this drastically affects her diving ability and enjoyment. Also causing her to struggle with higher-level dives and regularly experience lost move syndrome for extended periods of time. Daisy was involved in focus group two and gave limited responses to discussion topics. Her parent was present during the discussion, which could have affected her willingness to share her insecurities.

Austin

Austin is a skills diver, aged 12 years. He has been diving for three years. He currently competes on a regional stage at skills level, but is fairly new to competition standard diving so currently hold no regional titles. Austin does not appear to suffer

with training or competition anxiety and often is described by others as having no fear. He does however experience anxieties but is very adept at not showing them. Austin was involved in focus group two, he was comfortable being involved in the discussion but due to his age he sometimes struggled to clearly word his opinion. He also had a parent present during the discussion but this did not seem to affect his willingness to be open and honest with his responses.

Tom

Tom is a skills diver, aged 16 years. He has been diving for three years but has an extensive gymnastic background, which has assisted his speedy progression through the sport of diving. Tom currently competes at skills level but has recently begun entering open events with adult divers. He holds a string of regional and national titles. Tom suffers from mild anxieties when attempting new dives but this only seems to manifest on certain skills rather than across the whole sport. He does not struggle with competition anxieties and seems completely comfortable in a competition environment. Tom was involved in focus group two and due to his advance status within the team he was comfortable leading many of the discussions.

Will

Will is a novice diver, aged 15 years. He has only been diving for 2 years but due to existing gymnastic ability he has progressed through his diving programme quickly. As he is relatively new to diving Will does not have extensive competition experience, however he has had several respectable finishes at regional novice level and has recently begun entering competition with adult divers. Will is known for attending every session available to him, even voluntary sessions and public sessions, he will be at the pool if there is any opportunity to dive. Will does experience a small amount of anxieties when attempting new diving and in competition but his overall passion for the sport seems to outweigh this. Will attended focus group two, he took a secondary role in the discussion but this is in line with his shy nature.

Holly

Holly is an age group diver, aged 13 years, she has been diving for five years but also have a gymnastic background that assisted her diving development. She is currently competitive at an age group level and has held several regional and national titles. At the point of involvement in the study Holly had recently overcome a severe anxiety related to a particular skill, she has been unable get herself to perform the skill for over two years due to an accident, she was physically able to perform the skill but could not

get past an emotional barrier. Following the completion of this particular skill her outward signs of confidence in her ability rose dramatically. Holly was involved in focus group two and took an involved role in the discussion.

Transcripts of Focus Groups

Focus Group 1 – 8th August 2015

Six participants – Jane, Ian, Mary, Rose, Fern, Dylan

Duration – 36 minutes

Researcher – I want you to imagine you are at the point of learning a new dive when you answer the questions, I don't mind what dive it is but something that frightens you. How do you feel what you learn a new dive? What goes through your head?

Jane – Well you don't want to hurt yourself, for a start. For me that's the most obvious thing. Because yeah it hurts when you hit the water wrong

Researcher – So you are trying to avoid hurting yourself, what if you've done it before and it didn't hurt? Does that help?

Everyone – No

Researcher – What do you think about?

Rose – It's going to over rotate

Researcher - On everything?

Rose – Yes, literally everything

Mary – I don't know what goes through my head

Fern – It depends what mood you're in. If you're not feeling it at the start you're not going to do it. If you're in a bad mood it's not going to happen. It's got to be a really good day for us to do a new dive

Jane – I don't know, I guess when I'm trying to do a new dive I'm trying not to think about it, the consequences, you are trying not to think about it, and it's about thinking about what you've just got to do, like what the actions are that you've got to do, is like what you try and think about. Lets not think of anything else, yeah, because I think if you think about it too hard you get more worried so for me it's about trying really hard not to think about it because it's the thinking that's the issue

Dylan – Like when I dive I've got this feeling where like I don't see it and I know I can do it but I'm just worried about mis-seeing the water

Jane – that's really cool, because I hardly ever see the water so you're doing better than me, only when it's right there

Researcher –How do you get over negative feelings when you are learning a dive? Is there anything you do, any practices you do to get yourself over it?

Dylan – I visualise it

Jane – that's cool, I guess I'm more reliant, if my coach tells me to do it then I guess he wouldn't tell me to do it if he didn't think I could do it, so I say right ok I'm going to give it a go. But what else do I have to go off, and he definitely wouldn't ask me to do something he really didn't think I was going to do because its not in his interests for me to get hurt the same as its not in my interests to get hurt. The other thing is for me is that I'm just in actually in some ways not scared but more concerned about going home knowing I haven't tried it, and knowing I will be absolutely gutted if I go home knowing I had an opportunity to try something and I didn't. So it's kind of that I use to get over it too, because I would go home and say why didn't I just do that when I had the chance, because you don't know when you are next going to get the chance. So that helps me go for it

Rose – Repetition of the gradual build ups of the dive get boring, so when I get bored I just chuck the dive and hope for the best, because you get so bored of doing the same thing. Like if it was reverse, reverse jump, reverse jump, reverse jump, you do so many reverse jumps you get so bored in the end you just chuck it in the end and you go for it. That's how I see it

Fern – I just, once you've jumped you can't get back on the board, that's what I do. I think I've just got to jump and when I'm in the air I've just go to try and do it, so if I've got the courage to jump I will attempt the dive, but if I don't I wont. Once I'm off I can't get back on, that's what I do

Jane – so you might as well then

Fern – you've got to hit the water some how

Researcher – Do you feel better if you've done all the lead ups?

Ian – yes

Jane – yes

Rose – no

Mary – yes

Fern – yes

Dylan – yes

Researcher – 5 yes and 1 no

Dylan – Because like when you're working it up, once you've done that, you're confident with it and you feel like you want to do more. Like keep doing more and more, and if you just go for it, it will be a lot easier

Jane – I get tired. Yeah sometimes I find you can do too many lead ups if you're not careful. I know when I was trying to learn back 1 ½ which im still trying to learn. If you do too many just back summersaults you're programmed to come out and then when you actually go for the back 1 ½ its actually different because you kind of need to hold on for a bit where as you're not doing that in just a single back summersault. So I think too many lead ups is not good either. You need to go for it as soon as you can do that lead up and not just do the lead up lots

Ian – No I disagree, no I've got to do everything in a certain order. Not so much visualisation but I've got to start with the basic and work up to the slightly less basic. I can't just go straight in with the harder dive

Fern – It depends how busy it is, if it's too busy I find doing too many lead ups I can't do it. Because by the time I get on the board next time I've forgotten when I was meant to do the time before. So I prefer to do new dives when it's quiet. Plus I don't have loads of people watching which makes me feel more like I can do it. When it's too busy, like Monday night sessions, I can never do a new dive on them, it's got to be on Thursdays

Researcher – What kinds of people inspire you in your diving?

Dylan – A lot of the 3 metre divers, Jack Laughler, Chris Meares, Yona Knight-Wisdom. All the good ones.

Jane – I'm inspired by the other adult divers, because we all try hard together and actually we take each other's ups and downs. I think we support each other through the downs and celebrate everybody's ups, and its really really good. Because you don't have to go outside of that arena, it doesn't have to be somebody brilliant

Researcher – Does it have a positive or negative-effect watching people like that? Does it have an effect on your confidence at all?

Rose – Yeah, if I watch a competition, I will be like I'm the new Olympic diver, and I can try everything but then realistically when I come to the pool reality hits us and I'm never going to make it. Watching it give you such a kick, and you feel like such a better diver

and you feel more confident, but then me being me I get back to the pool and I'm just like nah, it's not for me I can't do that dive

Jane – I enjoy watching it as well and I really think it is inspiring, because it makes you go wow. I mean I'm never going to aspire to do 3 ½ summersaults off 10 meters but it doesn't mean I can't aspire to do more than I can currently do. And they've all had to go through it at some point too haven't they,

Researcher – How do other people effect your diving? How does your coach affect your diving?

Fern – I don't know he's. Sometimes if he's in a good mood I'm more likely to do it, I think oh you're being nice to me today so I will do this so it makes you feel better. But if he's in a bad mood I'm just like, either I will do it to put him in a good mood or I'm like nah. I'll stand at the side and not do it

Dylan – It's like when he sits on his step.

Rose – that's never good

Dylan – you know it's bad; he's trying to push you as hard as he can but it's really nerve racking. You feel like, will he go off it with me if I don't do it or will he be ok and be like you will get it next time.

Mary – When he's calling me out it makes me feel better because then I know he's calling me out and I know when to get out and I know I won't hurt myself, you've just got to trust him really

Researcher – Do your parents effect your diving?

Mary – No. They don't take any interest in my diving what so ever.

Researcher – Do you think it would help if they did?

Mary – No

Researcher – Would it make you more likely to want to try things if they knew what you were taking about?

Mary – Probably

Fern – Our parents think that they are some form of Olympic diving coaches, I'm not even kidding. They think they know everything; they are like 'ooo' that one wasn't very good, that one was a bit over, that would only be a 4. It really irritates you. So you don't do it even more so they can't comment. Cos they think that they are Olympic coaches.

Rose – Like when I was younger, like when I first got into diving you do what that spurt of when you are really, really good and like when I didn't go for a dive my mam would get annoyed, then I'd get annoyed and then we would argue, and I would be like I never

want to go back diving again and she'd be like yeah that's fine I'm never going to take you again you're not going to get anywhere. But then when I do get a dive she'd happy but if I don't do a dive she's angry, it's kind of a bit of both

Dylan – When I'm scared to do a dive I always look over to me mam when she's there or me dad when he's there, and they always give me the thumbs up saying you can do it, so that really helps us.

Jane – I was about to have a bit of a heart attack there that all parents are like a nightmare, thinking what do I do to mine. I'm glad our parents aren't there because if I go back and I say I've done a new dive, they are like oh my god what have you been doing. It's more like she doesn't want me to do the new dives because she doesn't want me to hurt myself

Researcher – How do kids affect adults diving?

Jane – They are mint, they're great, every time I've dived with this lot and I do something they are always like really really brilliant just fab. I can splat and they will support me or if I get something right they are the first to cheer and its really nice.

Ian – I think they probably do make me try a bit harder because they do diving. I don't know I haven't really seen them dive a lot but they do talk about it and I guess it would be quite cool to be the cool uncle

Jane – I would never say id done that to my kids, my diving is kind of separate to their diving I wouldn't try and compare myself to them really. My coach would, he tries to play us off against each other but I wouldn't, he's like oh he can do this now and you cant

Researcher –How do your teammates affect your diving?

Dylan – It depends what mood they are all in. If they are in a good mood they are like go on you can do it and cheer me on but when they are in a bad mood they are just like woo (sarcastic cheer) and really like depressed

Fern – I'm more likely to do a new dive if the conversations been good before I get on the board because then I don't think about it I think about whatever conversation we are having and then I do it when I'm having a good conversation beforehand.

Mary - They always seem to cheer you on, when you've done it wrong or you've done the wrong dive, or you've hurt yourself they always seem to be cheering you on and saying go on you can do it

Rose whispers to Fern – Does she think we all drag each other down?

Dylan – Its whether they are in a good mood or a bad mood again, they help you in a way because if you've done something they laugh and if you've done something and it all goes wrong they laugh and it cheers me up, but when its negative they do really cocky in a way, saying I can do this I can do it and its like yeah ok cool.

Dylan – I've never compared me to anyone

Rose – I kind of compare myself now as I've got older and lost so many dives, because obviously when you're younger you are more confident. When I get on the board I will say I wish I was younger because I was more confident, and then I would be able to fling myself off the board like everyone else does and I wouldn't be scared of hurting myself, but yeah I do compare myself quite a lot, because I've kind of gone downhill but I still enjoy it

Ian – I think I do compare myself against, I mean I'm relatively new compared to a lot of the other adult divers so they are all quite good and its nice to compare to what I might be able to achieve.

Researcher – Does comparing yourself to others help?

Ian - I wouldn't respond to that at all I don't think

Jane – I think I would kind of agree, I think its helpful at times and then its not helpful at other times. It part comes back to what everybody else has said it comes down to mood, if you're in the right mood to be going you know they've done it so you do it, at the right time and when everyone in is in the right mood it can help because it can spur everybody on. But other times you would be like I know they can do it but I'm trying really hard and I just cant, I think it depends at the right time its fine. Just not always

Researcher – How does your body feel when you dive?

Rose – Shaky and stiff, because your mind wants to go for it but your body just wont let you, because it knows there is an outcome at the end of it. Whether its entering well or smacking yourself, so your body is kind of shaking compared to the rest of you

Dylan – It makes you sort of like, when your ankles start shaking and when you go cold it makes you feel a little bit worse

Fern – It depends what direction I'm going in, if I'm going forwards my body seems to respond quite well because it can see where its going. But if I'm going inwards or reverse that's when I stand there for ages and my body just wont want me to go.

Jane – I try not to let my mind send any signals to my body or the other way round because I'm trying to completely blank everything out. To get you off the end. You know

the getting you off the end thing I'm just like don't think, don't react, just clear everything and go for it. It's about trying to do that really

Rose – Its normally on a back dive, I will stand there and I will do a dive but I will just be a back summy and I know what its from and I know how to stop it but I do the arm-swing and I'm still on the board and I'm like I'm not going anywhere, what's going on, its just like your body is stopping you from what you want to do, or if you are doing a hurdle step it feels like you cant start your hurdle step because your stuck to the board
Fern – I hit the wall when I come to do reverse from standing, I cant no matter how many, I can reverse from hurdle step fine but when it comes to reverse from standing I cannot get off, I cant do it, and then my body just wont let me for some reason I just cant do it like that

Rose – I normally have to be in a mood, like I will go up to my coach, what day was it, Thursday, I was watching people on the board and another diver did her first 1 ½ and I thought actually I quite want to try that. And I will start up the stairs and get quite excited and I will have to smile or jump about a bit to actually get my body moving to make us go. So I kind of have to be in the mood and ask to want to learn a dive and that's when my body co-operates with my mind, because I know I want to learn it, I want to do it, whereas if I don't want to learn it my body shuts down and it just wont do it

Researcher – So if you've gone to the coach and said I want to do this

FG007 – I want to do this, I want to learn it, can you take me through the basics and the steps, its like when I lost my confidence on my inwards one day I did ask my coach to go through it and I did it, and then next session he was like right go for your inwards and I wouldn't do it at all, I just couldn't do it

Researcher – Is there anything else anyone wants to add? Great thank you very much we will end it there.

Focus Group 2 – 15th August 2015

Six participants – Ruth, Daisy, Austin, Tom, Will, Holly

Duration – 36 mins

Researcher – I want you to imagine you are at the point of learning a new dive when you answer the questions, I don't mind what dive it is but something that frightens you. How do you feel what you learn a new dive? What goes through your head?

Tom – The biggest thing of learning a new dive that stops me is the fear factor obviously, and it's just the fear of splatting and hurting yourself

Researcher – what do you think about when you are stood on the board ready to go?

Austin – You just kind of think will I splat or will I make it. You just take a deep breath and hope god is looking out for me and think he'll make it nobody else will

Ruth – I try to be positive like and that normally lasts until about half way through trying the dive then everything is just no.

Austin – You've got to try and think of the dive, and think I'm focusing and thinking about it, back to front what to do and then when you are at the end of the board you are like oh god what do I do again, so you try to keep going over it and when you do it you do it and don't even realise it.

Will – I think don't do it, that's it. I don't feel like doing it

Researcher – Is there any way you get past that? You must have done because you've learnt dives

Will – You just do it

Austin – So you keep saying don't do it but then you do it

Will – Yeah

Researcher – what do you do to get over the negative feelings about learning new dives? Do you have any tricks to get yourself past it?

Daisy – Just think positively really

Tom – I watch diving on the TV and it makes me feel like I can do it, and it gives me a positive feeling and gives me support, and when it comes to it the only thing that blocks it is the fear of doing it and obviously splatting or hitting the board

Holly – I watch myself doing the dive in my head and see myself doing it from different angles

Researcher – Do you feel better if you've done all the lead ups?

Austin – Like from 1 to 3 to 5?

Researcher – As in, if you were doing a back 1 1/2 , you've done the back dive, you've done the back summersault

Austin – Then id think I've made it this far all I have to do is add those two together then you've got it, because you know you've already done the dive and the summersault so why not just put it together.

Ruth – Once I've done the lead ups I'm fine to go for the dive up until the point when I have to start to do the dive is when I get really nervous, even if the lead ups go fine it's the actual dive that scares me a lot

Will – when my lead ups do really good I think positive and I think I'm going to do the dive, until I get onto the board and then I have a panic attack and don't do it.

Researcher - What is it between doing the lead up and getting to the end of the board, what happens?

Will – I've got no idea

Holly – I think you just over think and it stops you from wanting to do it anymore. Like you want to do it but you're scared in case it will go wrong

Researcher –What kind of people inspire you when you dive?

Austin – The coaches and all your friends around you. It's like you want to try and impress them. And say I can do this how about you try to do it then when you do it you can be yep I can do it

Tom – The people who inspire me are on the TV like I said, in Tom Daley, Jack Laugher, Chris Mears who have won past Olympic, European and worlds which I find really impressive and you think I want to do that kind of thing and that's what makes me have the motivation to do diving

Researcher – So watching people like that does it have a positive or negative effect on your confidence?

Austin – I think it have a positive effect because it shows that it isn't impossible, even if they are better than you it shows that in quite a while depending on who long you've been diving you will be able to do it. It's even worse when they are younger

Researcher – How do other people effect your diving? How does your coach affect your diving?

Austin – Whenever you're like you've done a dive but the coaches aren't looking you like aww come on that was a good one why couldn't you just have saw that but when they look at you you're thinking oh god what if I mess up, then they will see I messed up and won't let me go on to the next dive

Tom – I think the coaches really inspire you, especially when they've had past dives because they know what you're going through kind of thing, and the feeling when you've done it, the achievement, when you go home you feel really happy and positive

Daisy – They urge you on and that kind of boosts your confidence knowing they have faith in you and believe that you can actually do it

Will – I feel like I can do the dive more when the coach is happy, and they are not all grumpy

Tom – That's true

Researcher – How do your parents effect your diving?

Tom – The main person in my family is my mam, which is good because she doesn't know hardly anything about diving, so I just say yeah I did pretty good and she will just agree with us. My dad pays a lot financially and he does help but he works away a lot so I don't see him as much as my mam, but yeah he also supports us.

Ruth – My mum could be a bit harsh, she's not so bad now, she knows it kind of irritates me I've been doing it for so long I know I can do it. Its not a bad thing but its kind of irritating how harsh she was but now she's kind of calmed down a bit because when we were arguing it didn't help it just made it worse

Holly – my mam and dad help us when I can't do a dive, they will say its easy, I've seen you do stuff like that before and then I feel as if I can do it better. And when I go to do the dive I'll attempt it rather than just not try at all.

Austin – I think sometimes it has positives and negatives, it can be a negative because when you are learning a new dive and you see your mam or dad watching you if you mess up they will be say don't worry it was just a normal mess up but it messes with your head, but what I enjoy is when I've done a hard dive like handstand off 5 and I see my mam and she's like good lad, but I know when they are doing it they are like argh what if he messes up even when I'm trying to do the dive.

Researcher – Do your teammates have a positive or negative effect?

Tom – A lot of my team mates have a positive effect because its obviously support and it keeps you going, especially with people your own age because you can relate to them more, because they know what you are going through socially and at school and that. Because they also effects you in diving if you have a bad atmosphere at home or at school you perform worse at diving I would say and if its good it makes you perform better

Ruth – It does have a positive effect because I'm trying to do my reverse and everyone is like go on go on. It depends if they are trying to me smart or not

Austin – Its quite good because whenever you are trying a new dive, whenever you ask for a splash if you do they are always like come on you can do it just believe in yourself and you know they will be watching you and supporting you all the way.

Will – it has a positive effect on us and I feel I can do it when everyone is saying go do it, you can do it. Makes me feel happy

Tom – happy family

Researcher – How do you feel when you compare yourself to other people?

Austin – It just depends if they are better than you or not, because if they are doing all the dives you wish you could do it can sometimes put you down because you feel like you will never be able to do that, but when you are better than them and they are trying a new dive you just think yep I can do that I think I learnt it about 6 years ago

Holly – they seem so much better, because they do more training than we do they probably would do better dives and neater entries

Ruth – I try not to compare myself to other people because when I get into conversation with them I find out they've only been diving like 2 years or 6 months and it brings me down a lot, so I try not to watch other people at competitions because it just makes me feel rubbish

Austin – I think when you are watching other people dive and they are really good and they get like 5 ½ or 6 you think oh god if they are that good and they are only getting that score I'm never going to get that good but I think that's only because you can see how you dive yourself. Because sometimes you feel aww that was terrible and you come up and everyone is clapping and you think was that good?

Researcher – So how does your nerves affect you when you learn new dives? What does your body feel like?

Tom – Again with the fear it always stops you from doing things, like a mental block and it's nothing to do with the physical it's just the mental side of things

Ruth – Even if I feel I'm ready to do it it feels like there is a barrier that stops me from doing it, it's almost an automatic you are scared you can do this dive

Tom – again with people who they inspire you and persuade you to do more things if you are nervous doing a dive and the coach will say everyone splash on 1 and it obviously it always gives you a push to do more because you don't want to disappoint them, and you don't want to disappoint the people who watch and your family who've paid to get you here

R – Has anyone else experienced a barrier like Ruth?

Everyone - yeah

Researcher – So how do you get past it?

Ruth – I haven't so far

Austin – I think how you get past the barrier or invisible wall is just by believing in yourself and sometimes you can really surprise yourself in what you can do. Like I can remember when I was doing the 2 ½ off 3 and I was just thinking you can do it, even if you don't do it. It will just be like falling into a soft pillow with everyone splashing. So you can either go big or go home, and that made me just smash through the invisible barrier and I was close but didn't exactly make it

Holly – the fact that I really wanted to do it because everyone else was doing it and I just decided that I had to move on and try new things or get different dives back that I used to do

Researcher – Is there anything you do that helps you learn new dives?

Daisy – Imagine yourself doing it, run through the routines for it all and the lead ups to get in the right frame of mind for it

Austin – I just talk to my friends because I know they will support us because they keep me going mentally and physically

Ruth – I try not to think about it, because if I think about it when I'm not on the board that's how I get scared so I don't think about it at all until I get onto the board and then I put my mind into the dive

Austin – what I do it like whenever you try a new dive and you don't do it, like when you are about to but then you coward out I think every time you do that you just get more scared of the dive no matter how much you want to do it, so if you kept doing that for a few months you would be like narr I cant do this dive and if that was for forward 2 ½ if you were too scared to do 2 ½ there is no chance you would try a triple.

Researcher – how do you feel when you haven't done a new dive?

Will – I feel annoyed with myself and when I get home I just think I should have done it

Holly – I feel as if when I get home I think if I had just tucked a bit more I could have been round and I feel as if I cant do anything else when I cant do that particular dive

Austin – After a good session you feel like you can do anything

Holly – yeah, because I think if id tucked it a bit more, I will try and do that next time

Austin – whenever I don't do a new dive I feel like the coaches will be disappointed in me but when I do it I know they are so proud of us and they are sure that we can do a new dive, because you would never go to a beginner diver here do you want to try a double because they would know they wouldn't be ready

Researcher – is there anything else anyone wants to say, good stuff thank you very much.

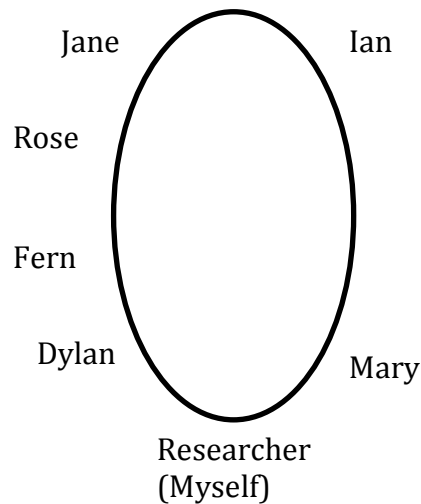
Observational Notes

Focus Group 1 – 8th August 2015

Six participants – Jane, Ian, Mary, Rose, Fern, Dylan

Duration – 36 minutes

All participants entered the room confidently, chatting and conversing with other participants. All participants took a seat at the large oval table in the meeting room. The researcher (myself) sat at the end of the table closest too the door. Continuing around the table to my right was Dylan, Fern, Rose, Jane, opposite Jane was Ian, then there were two spare seats then Mary sat to my left (see diagram below).



All participant make it clear they had understood the aims and objectives of the focus group, and understood they were able to speak freely and should allow others to speak clearly too.

They seem reluctant to answer questions at the beginning of the focus group, casting looks between themselves, trying to see who will speak first. There is silence followed by laughter.

Jane seems very confident speaking in front of the group, this may be because she is an adult diver and does not feel she needs to fit in with the other members of the group.

Mary seems very reluctant to speak in front of the group offering short one word answers or short sentences. She speaks into her chest and doesn't look around the

room. This differs from her demeanor before the session begun where she was chatty and outgoing.

Fern seems confident; she seems to have a higher status among the group. This is probably due to her higher competitive level and status as a long-standing member of the club.

Jane is very complimentary of the other participants, using encouraging language. She often complements another person's ability and belittles hers in the same sentence.

Dylan waits until the discussion has established before speaking. He is quite and shy, this may be due to his age, and being the only junior male. He describes technical skills he has learnt but struggles to find the right vocabulary to vocalise his point.

Jane, Fern and Rose discuss very confidently among themselves. Jane is very interested in Fern and Rose's experiences as higher-level divers.

Ian waits until nearly 10 minutes into the discussion to speak. He speaks about the way he prefers to learn his dives. He also belittles his achievements. This may be because as a relatively new diver he cannot relate to the more difficult dives being described by the higher level divers, Fern, Rose and Dylan.

Dylan is quick to mention famous divers he looks up to, several are local divers he has seen perform in person.

Rose is very descriptive about her feelings about wanting to be higher level. She talks about thinking she could be an Olympic diver, she is quick to clarify that it is just a pipe dream and she does not think it is a real possibility.

Jane describes watching high level divers as inspirational but not on a personal level, she seems to find what they do impressive but not relatable.

They all laugh and snigger when conversation turns to coaching staff

Fern and Dylan hint to their coach having differing moods in different session. They describe when the head coach is in a bad mood he will sit on a step by the poolside.

This behavioural cue is recognised by all the divers in the room as being a bad sign.

Dylan then goes on to describe how he feels this is a sign of disappointment from his coach, however his body language is loose and he laughs.

While the others talk of the coaches bad moods Mary is quiet and holds her arms close to her face. When she chooses to answer the question she describes the positive aspects of the coach and how she feels he has helped her. She appears to have a slight defensive tone.

When the conversation moves to comments of parents involvement Mary is quick to mention her parents have no interest in her diving. This comes as a shock to the group. She is quick to clarify she doesn't mind and doesn't really want them to be involved.

Fern and Rose suggest their parents are quite the opposite and are too involved. They laugh and joke about their parents' involvement but the situations they describe seem to be quite pressurised and stressful. They describe altercations with parental figures caused by diving.

All participants highlight the positive input of their teammates. Rose and Fern seem slightly offended by the insinuation that teammates can be anything but supportive. Dylan disagrees and comments that sometimes he feels teammates can be less helpful. He describes their input in a sarcastic voice.

When describing physical and emotional reactions to diving all participants struggle to articulate themselves.

Rose, Dylan and Fern describe physical reactions when attempting new dives.

Rose and Fern describe a situation where they feel they cannot move. Both struggle to articulate what is holding them back beyond 'your body just won't let you'.

They seemed to display a level of frustration that they cannot describe the feelings they experience. When asked to expand on their comments about their barriers most participants struggled to find the words and stopped talking.

All participants leave the room without displaying any signs of discomfort.

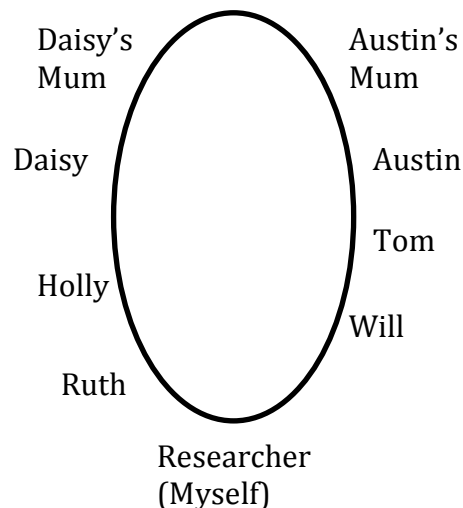
Focus Group 2 – 15th August 2015

Six participants – Ruth, Daisy, Austin, Tom, Will, Holly

Duration – 36 mins

All participants entered the room confidently, chatting and conversing with other participants. Two participants has their parents present, it was unclear if this was their choice or the choice of the parent.

All participants took a seat at the large oval table in the meeting room. The researcher (myself) sat at the end of the table closest too the door. Continuing around the table to my right was Ruth, Holly, Daisy, Daisy’s Mum, then on the opposite of the table was Austin’s Mum, Austin, Tom and Will. (see diagram below).



All participant make it clear they had understood the aims and objectives of the focus group, and understood they were able to speak freely and should allow others to speak clearly too.

Immediately Daisy's body language was very introverted, she crossed her arms and lowered her head.

Tom is the first to speak, he one of the oldest in this group and it is clear he has a high status in the group. Tom speaks very clearly and uses advanced vocabulary.

Austin is religious and is quick to mention his faith. In the transcripts this may read as blasphemous but it he seems to genuinely use his faith as a method of confidence and motivation in his diving.

Ruth is also an older member of the group but she is much less confident with her status in the group, this may be due to the fact she is a long-standing member of the club but still remains at a low standard.

Austin is quite new to the group and is the youngest member, this does not hold him back from speaking. It is clear from his demeanor and body language he is not overly concerned with how he is perceived.

Holly begins quite shy but opens up and becomes more confident as the discussion progresses. Previous information from coaches has mentioned Holly has struggled a lot with anxiety and it has effected her diving a lot.

Austin talks about trying to impress his teammates, he looks around for approval and his gaze is often avoided.

Daisy remains silent and often looks to her mother when questions are asked. She may not be speaking due to her mothers presence.

When Daisy speaks her answers are short and do not offer much insight into her opinions.

Daisy offers no comment when the discussion turns to parental input.

Tom shares that his major input is his mother, he seems very appreciative for her input to his diving. He mentions his father works away so does not have as much input in his diving, but supports him financially. Commenting on the financial support of a parent is a very mature viewpoint for a 16-year-old child.

Ruth describes altercations in the past with her mother about her diving progression, she recounts the story with a level of anxiety.

Austin is not deterred by his mother's presence and is candid and honest, which she seems to appreciate. When he makes a comment about his perceptions of her in relation to his diving he giggles and so does she.

All participants are very complimentary about their teammates, this may be due to the focus group setting. Would they have said that if their teammates weren't there?

Only Austin is honest about some negative input from teammates but this fits with his level of honesty and disregard for how he is perceived. No participants seem to be offended or upset with what he says.

Tom is very quick to dismiss a physical cause for his nerves and maintains he feels it is all mental.

Yet Ruth mentions a 'barrier' she cannot describe that stops her. As she describes it it's clear she cannot articulate fully what she wants to say, she takes her time to try and find the words but still struggles, displays a level of frustration and eventually moves the conversation on. This is very similar to the previous focus group. Why can't they describe it?

Austin describes the barrier as an invisible wall.

When discussing not attempting a skill Holly describes a long standing skill she struggled with for several years until very recently. She begins to show signs of distress when recounting how she felt when she could not perform the skill. Despite the potential

research interest of this reaction, I (the researcher) quickly move the discussion on as I (the researcher) am concerned at causing a child distress.

Holly's demeanour changed very quickly when discussing her reverse dive, she became visibly upset within seconds of beginning to discuss the experience.

Austin also offers encouragement for Holly by sharing that he feels the same but he offers a positive note, that everyone is proud of them.

All participants left the session happy, and no one highlighted a wish for further support.

Sources of Self-Efficacy with Raw Data Examples

Source	Definition	Raw Data Example
Mastery Experience	Confidence gained following previous success and lack of confidence following failure	"I've got to start with the basic and work up to the slightly less basic"
		"it knows there is an outcome at the end, whether it's entering well or smacking"
		"I don't know what goes through my head"
Vicarious Experience	Confidence gained from watching and copying others or imagining oneself performing an action, either in person or indirect methods such as videos	"If I watch a competition, I will be like I'm the new Olympic diver" 'I try not to watch other people in competitions because it just makes me feel rubbish'

		“I watch myself doing the dive in my head”
Social Persuasion	Positive or negative confidence gained from others, such as teammates, coaches or audiences	<p>“I’m scared to do a dive I always look over to me mam”</p> <p>“When he’s calling me out it makes me feel better ... you’ve just got to trust him”</p> <p>“A lot of my team mates have a positive effect”</p> <p>“If they are doing all the dives you wish you could do it can sometimes put you down because you feel like you will never be able to do that”</p>
Physiological and Emotional States	The effect of physical indicators on self-efficacy beliefs, such as heart rate, fatigue and pain, whereas emotional states refers to the effect of emotion on self-efficacy beliefs, for example fear, joy or self-doubt	<p>“The biggest thing of learning a new dive that stops me is the fear factor”</p> <p>“I have a panic attack and don’t do it”</p> <p>“I feel as if I can’t do anything when I can’t do that particular dive”</p> <p>“I feel I’m ready to do it there feels like there is a barrier that stops me”</p>

“I depends what mood
you’re in”

Professional Profiles

Member Checking

Psychology professional. She holds a senior lecturing post at the University of Sunderland. Her major research interests are psychology, physical exercise and health. She gave detailed written comments on the focus group questions via email.

Diving professional. He has been coaching for eight years for two separate clubs within the northeast region, and is currently holds the position of head coach. He holds a UK coaching certificate level two in diving coaching. He dived himself to international level within the masters diving community, attending international diving events between 2004 and 2007. In addition to this he also competed in senior events, achieving podium placements against divers half his age at national and international senior events. Due to the time constraints of his job commitments he was able to give comments and approval for the focus group questions via email.

Independent coder. He holds a senior lecturing position with the University of Sunderland. His major research interests are psychology, physiology and sport. He is currently undertaking research with children and adolescents so can offer insight into the implementation aspects of the project. she offered independent coding of transcripts and observational data.

Participant Screening Information

Study one aimed to recruit divers who had previous experience of anxiety, physical or emotional difficulties during competition and skill acquisition. The head coach of the club involved in the study provided information about divers he deemed suitable for the study. Below is the information he provided on the participants that were selected for the study.

Daisy

She regularly freezes on the board when it comes to performing important dives. She beats herself up when she doesn't perform the way she wants to. She puts too much pressure on herself. She has a lot of parental pressure too.

Holly

Holly is very concerned with how she looks, so she loses confidence when she thinks a dive may not look perfect. She has had a series of injuries, including hitting the board with her entire lower body. She suffers from a lot of anxiety relating to the dives associated with her injury.

Jane

She is very concerned by others opinions and this affects the way she approaches diving. She puts too much pressure on herself. She falls apart in competition and cannot perform like she does in training.

Ian

He has an intense fear of heights. He also suffered an injury, which restricted his diving and the recovery has left him with a lot of anxiety in relation to new dives.

Mary

Mary has a lot of problems with competitions due to having a poor first competition performance which involved hitting the board. She has a lot of self-doubt and struggles to believe she can do anything positive.

Dylan

He has pressures from school and home, which affect his diving. He does not have a very good grasp of his own level and sets unachievable goals. Then when he does not achieve the goals he suffers serious self-doubt.

Rose

She has a poor relationship with her coaching staff due to moving clubs several times during her diving career. She has also had a series of serious accidents due to being

pushed too hard by other coaches, which caused a lack of confidence. She also struggles with a fear of heights.

Fern

She has a poor relationship with her coaching staff due to moving clubs several times during her diving career. She has also had a series of serious accidents, which caused a lack of confidence. She was also put under a lot of pressure as a youngster and made to believe she would be the next big thing. She was given targets and goals by previous coaches she could not fulfil, causing her to have a very low opinion of herself and her diving.

Tom

He has struggled with growth related back injuries that effected his diving and caused him to loose a lot of his more complex dives. He has lost a lot of self-confidence and self-worth.

Will

He has suffered a series of family problems that has affected all aspects of his life. He struggles to focus and can become overwhelmed by his emotions.

Ruth

She has a total lack of belief in her own abilities. She is also very stubborn and struggles to take direction or help.

Austin

He struggles with his attention and focus. He sets himself unachievable goals and struggles to listen to coaches reasoning for why the goals are unachievable. He also has a disregard for his own personal safety, which causes him to push himself too hard causing injuries.

Recruitment Email

Dear Coach

As part of my PHD research I am researching diver's self-belief. As part of this research I aim to get a better understanding of what scares divers, what holds them back and how they get themselves to perform new dives. I am looking for a small group of divers over the age of 12 (on the date of the focus group), to get together and discuss how they feel when they dive.

Parents are welcome to sit in if they want to and both divers and parents can withdraw themselves at any point if they feel it's too much. The group discussions will be recorded using a Dictaphone; all information will be anonymised so only the people in the room will know who said what. There will also be an option to write down their answers if they are not comfortable voicing them to a group. The groups will take place at your centre at a time to suit your training programme.

Please could you distribute this email to all divers you feel would be interested and suitable for the study.

Kindest Regards
Emily Pattinson
Sports Psychology Researcher
University of Sunderland

Participant Information Pack

Participant Information Sheet

Study Title: A Qualitative Investigation into Self-Efficacy in a Diving Context.

What is the purpose of the study?

The study is part of my PhD thesis in the department of Sport and Exercise Science, University of Sunderland. The purpose of this study is to gain greater understanding of self-efficacy in divers during training and learning new dives. Self-efficacy is a psychological theory put forward by Bandura (1977), it refers to a person's belief in their ability to perform a task or cope with a situation. Self-efficacy has been linked with better performance in many sports.

Why have I been approached?

You have been contacted because you are a diver over the age of 18 years

Do I have to take part?

All participation is voluntary, and any participant has the right to withdraw themselves/their child for during and up to 3 weeks after participation.

What will happen to me if I take part?

Participants will be invited to attend a focus group

Participants will be invited to attend an informal meeting in groups of 5 or 6. You will be asked to partake in an informal chat about your experiences in diving. These groups will be audio recorded, the recording will then be destroyed after transcription. The session will aim to last 30 minutes.

What are the possible disadvantages and risks of taking part?

You will be asked to discuss times of difficulty or injury which may cause slight emotional distress

What are the possible benefits of taking part?

You will be helping to gain further insight into self-efficacy in diving, and assisting the development of further research.

Will my taking part in this study be kept confidential?

All information obtained will be anonymised, and all consent forms will be kept in a secure locked cabinet away from focus group documentation.

What will happen to the results of the research study?

The results will be analysed and presented as part of a PhD thesis submitted to the University of Sunderland. Results may also be used as part of peer reviewed journal articles and conference presentations.

No participant will be identifiable in the thesis but if you change your mind about your data being included in the study, as long as you contact us within three weeks of testing taking place, the data can be removed entirely.

Who is organising and funding the research?

The research is organised by Emily Pattinson who is a doctoral student at the University of Sunderland, Department of Sport and Exercise Science. This project is not externally funded.

Who has reviewed the study?

A departmental subcommittee of the University of Sunderland Research Ethics Committee has reviewed and approved the study.

Contact for further information

Emily Pattinson (email: bg54wm@student.sunderland.ac.uk)

Dr Sandra Leyland (Project Supervisor)

Email: sandra.leyland@sunderland.ac.uk

Phone: (0)191 515 3841

Dr Etta Evans (Chairperson of the University of Sunderland Research Ethics Committee)

Email: etta.evans@sunderland.ac.uk

Phone: 0191 515 2624

Participation Consent Form

Study title: A Qualitative Investigation into Self-Efficacy in a Diving Context.

Participant code: _____

- I am over the age of 18 years
- I have read and understood the attached study information and, by signing below, I consent to participate in this study.
- I understand that I have the right to withdraw from the study without giving a reason at any time during the study itself.
- I understand that I also have the right to change my mind about participating in the study and can contact the researcher to have my data withdrawn from the study (within 3 weeks of participating)

Signed: _____

Print name: _____

Date: _____

Junior Participant Information Sheet

Study Title: A Qualitative Investigation into Self-Efficacy in a Diving Context.

What is the purpose of the study?

The study is part of my PhD thesis in the department of Sport and Exercise Science, University of Sunderland. I am looking to get a better understanding of what it is like to be a diver and how it feels.

Why have I been approached?

You have been contacted because you are a diver between the age of 12 - 17 years

Do I have to take part?

It is voluntary. It is your choice. If you change your mind you can leave at any time.

What will happen to me if I take part?

You will be part of a small group of divers talking about their diving experiences with a researcher. Your voice will be recorded, then the conversations will be written up and the recordings deleted.

What are the possible disadvantages and risks of taking part?

You will be talking about your diving, the good parts and any bad parts, this might make you a little upset.

What are the possible benefits of taking part?

You will be helping to understand divers and help to make new research into diving possible.

Will my taking part in this study be kept confidential?

No one outside the group of divers will know what was said by which diver. All names will be changed, so no one will know who said what.

What will happen to the results of the research study?

The results will be written up for part of my PhD degree and possibly written up for scientific papers.

Who has reviewed the study?

A departmental subcommittee of the University of Sunderland Research Ethics Committee has reviewed and approved the study.

Contact for further information

Emily Pattinson (email: bg54wm@student.sunderland.ac.uk)

Dr Sandra Leyland (Project Supervisor)

Email: sandra.leyland@sunderland.ac.uk

Phone: (0)191 515 3841

Dr Etta Evans (Chairperson of the University of Sunderland Research Ethics Committee)

Email: etta.evans@sunderland.ac.uk

Phone: 0191 515 2624

Participation Consent Form

Study title: A Qualitative Investigation into Self-Efficacy in a Diving Context.

Participant code: _____

- I am over the age of 12 - 17 years
- I have read and understood the information and want to be involved in the study
- I understand I can leave at any time
- I understand that I can change my mind by telling the researcher

Signed: _____

Print name: _____

Date: _____

Parental Signature: _____

Print name: _____

Date: _____

This appendix details the audit trail for study two which aimed to investigate the potential barriers and facilitators related to mental block and imaginary barriers in diving using reflective case studies of retired divers. The contents of this audit trail are detailed below:

1. Details of interviews
2. Interview questions
3. Participant profiles
4. Transcripts of interviews
5. Meaning units, themes and sources
6. Sources of self-efficacy with raw data examples
7. Professional profiles
8. Screening questions
9. Recruitment Email
10. Participant Information Pack

Details of Focus Groups

	Interview 1 – Tony	Interview 2 - Martin	Interview 3 - Kathryn
Duration	38 mins	27 mins	24 mins
Communication Method	Video Call	Video Call	Video Call
No. of Participants	1	1	1
Gender	Male	Male	Female
Age	35 years	23 years	20 years
Level of Diver	Retired International	Retired National	Retired National
Highest Level of Competition	National Senior International Master	National Senior National Master	National Senior
Age at Retirement	25 years	19 years	18 years
Reason for Retirement	Injury	De-selection	De-selection

Interview Questions

1. Describe an experience when you struggle to perform a dive?
2. What was the main reason you struggled to perform the dive?
3. What physical feelings did you experience at the time?
4. How did you feel emotionally?
5. How did you get over those feelings?
6. Who inspired you during that time?
7. How do you think your coaches affected your diving at the time?
8. How did your parents affect your diving at the time?
9. How did your peers and teammates affect your diving at the time?

Participant Profiles

Tony

Tony began diving at the age of 7 years, and gained 18 years of diving experience before retiring at the age of 25 years old. During his career he trained at

three different clubs, he began at a small club in the southwest before moving to a centre of excellence in the south of England. Tony competed up to national senior level as a junior and then moved into international masters events at the age of 24 years. Following an injury to his inner ear in his second year of international competition Tony was forced to retire. Tony reported struggling with anxiety and mental block throughout his career, but mainly during his transitional years into age group and elite events.

Martin

Martin began diving at the age of 8 years in a small club in the northeast region of the UK; his career lasted 11 years and ended with voluntary retirement following a failure to gain selection to a centre of excellence. Martin competed at national level in skills, age group, senior and masters levels, gaining podium finish at regional and national events. Martin retired from diving to pursue an alternative career. Martin reported experiencing high levels of anxiety when learning new dives.

Kathryn

Kathryn began diving at the age of 6 years old in a small club in the northeast region of the UK. She competed at skills, age group and senior level; her career spanned 12 years and ended with voluntary retirement following a failure to gain selection to a centre of excellence. Kathryn narrowly missed out on national titles in elite individual and synchronised diving events. Kathryn moved into coaching and now coaches diving as her full time job, whilst pursuing a university education. Kathryn reported struggling to learn certain dives despite having the physical skill to perform the dive, causing her diving progression to halt at several points during her career.

Transcripts of Interviews

Interview One – Tony

Tony was interviewed via video call on an evening to fit around his work. The interview lasted 38 minutes.

Researcher - Describe an experience when you struggle to perform a dive?

Tony - When I was learning a front 1 ½ and I would do a front summersault any day of the week and I said to the coach I want to try a front 1 ½ so in my mind it would be to do a front summersault and duck the end. I did that and face planted, and it really hurt. I wasn't nervous about going for it, I had done lots of front summersaults and I thought all I have to do is duck the end and I will go in on my head but it didn't work and it took me weeks to do it again. Reverse dive was a big no no for years. I really don't know why. My biggest memory was when I was a little older and I was doing reverse dive and he tried to correct it and get it better. And that's when I landed completely flat on my front and hurt myself quite badly, and was sick because of it. But that didn't put me off it so I must have been a bit older, I must have been about 15/16.

Researcher – Was there any other dives or situations you struggled with?

Tony - I never liked 3 metre, because I didn't train it, we didn't have a 3 metre. So the only time I would go off a 3 metre was generally at a competition. Then we started doing 3 metre training on every other Sunday in London. But we would only get an hour maybe 2 off a 3m and 5m, and I was pretty tentative, I didn't like it. It was took high and scary, id not done it before. There was a lot of people around me doing a lot bigger dives and they were a lot older, and there was people the same level as me. But of course they could do a lot bigger dives they were a lot older, so there was not the progression of someone the same age and standard as me doing the same dives, progressing, there was nobody. They were just a hell of a lot older than me, so of course they are going to be doing the 2 ½ s , back 1 ½ s and reverse 1 ½ s. It wasn't until I hit 16/17/18 before I started going for anything, knowing that I had the ability. I think it potentially was self-belief, did I believe I could do it, well I must of done if I thought I could do a front 1 ½ and just duck it in rather than holding it and doing it properly. Why it went through my mind that that would be the best way of doing it I don't know. I remember trying to do a front 1 ½ with ½ twist, I said to my coach I want to do it and he said go on do it this way and I said no I will do it my own way and it ended very very very badly. I landed flat on my back I don't know how I managed that, I don't think I even did a summersault. I just completely lost where I was and didn't listen. But I had the bottle to go I know how to do a front 1 ½ and I know how to do a front dive ½ twist I will just put the two together and it will be fine, rather than doing lead ups. I could just go for it and thought what the hell I might was well. But when it came down to higher boards or new things that were a

bit and beyond. I would never do 5-metre as a youngster, I wouldn't jump off it. It took me weeks and weeks, the first time I jumped off 5 metre I was holding a girls hand. Now I don't think I was that old but I must have been over 10, I must have been over 11 I would have thought.

Researcher - What was the main reason you struggled to perform the dive?

Tony - Fear. What could go wrong, why it could go wrong, am I ready, do I feel like I can make it easily. It is exciting, there is excitement about learning and being able to do a new dive. There is a bit of an adrenaline rush from wanting to do it, doing the lead ups for it and wanting to do it, then just going for it, but you are always nervous about is it going to go wrong, is it not. But if you've done the lead ups for it right, it's the excitement of saying yes I've done a new dive, I've put it in, it may not be brilliant but I've done it. The stopping you, the scariest bit is the fear its going to go wrong, or its going to hurt, or you're going to look silly, but then there is the excitement of being able to get it and do it

Researcher - What physical feelings did you experience at the time?

Tony - Petrified, shaking, nothing worked, lethargic, but then sometimes when it was a new dive I thought I could do it was easy and I didn't know why I wasn't doing it. I was almost over-confidence, bouncing too much and then it all going wrong. I remember a lot of it going wrong, when I thought it would be easy, just thinking I need to do this this and this and it will be easy, then doing it and it obviously wasn't. It all went wrong.

Researcher - How did you feel emotionally?

Tony - In tears, but I think I was young. I was in tears; not wanting to do it, being asked to do it, frightened that I couldn't do it wouldn't do it. I don't think there was a point where by body physically wouldn't do it, it was my mind saying no just don't do it, balk it, just don't go.

Researcher - How did you get over those feelings?

Tony - I would always want to do more lead ups than necessary to convince myself I can do it, keep doing lead ups, really overdo the lead ups, make sure they are going over and more than likely hurt myself doing lead ups so I know it will go round, because I don't want to hurt myself trying the new dive. Its, not because its only pain, it will go away. I've hurt myself so many times it will go away. Its It's the ... yeah what is it then? It's I think its more the fact of losing where you are, of not knowing you are going to make it, the pain that comes with ouch that wasn't supposed to be there, where is your doing a lead up you can see it, so im going to take it a little bit further. With a new dive its like if it doesn't go round or its goes too far, or not enough, that's it there is nothing I can do about it at least when you are doing the piece by piece with the lead ups you just tag a tiny little bit extra on the top of it. My self-belief was sort of overcome when I get scared I start swearing at myself. And swear a lot and remind myself its only pain. F*** it F*** it F*** it its only pain. And that generally give me more confidence to go for it because its yeah why not its not going to hurt forever, I'm not going to die, what's the worst that can happen. So it's the also the thought of achievement of getting it over does the fear of going wrong. If I get it look what everyone will say look what the achievement will be. Where if I don't get it what's going to happen, it's going to hurt, people are going to laugh, its going to be quite funny. But If I do make it, its going to look good, everyone is going to be screaming and shouting out, and I'm going to be screaming and shouting inside thinking yes I've done a new dive. It's the uncertainty of knowing whether its going to go, are you going to make it, knowing you can make it.

Researcher - Who inspired you during that time?

Tony - The big names inspire me wanting to do, Pete Waterfield really inspired me, Leon Taylor did. Doing the stuff, fair enough I never thought I would be able to do the stuff they were doing or even come close to it, but watching them and seeing them do it made me think I must be able to. Also other competitors' im diving against if they're doing that dive why arn't I doing it? They can do it I must be able to do it, I'm as good as them. So having in effect a teammate or diving buddy that dives with you and pushes you and you push them to learn new things and drive forward. Most of the progression I did was when somebody was at the same level that I was, and they were pushing for new dives so, so was I, we were copying off each other to get the new dives.

Researcher - How do you think your coaches affected your diving at the time?

Tony - It depends on the coach. If I have trust in the coach and the coaches ability and I trust the coach its very positive. If I do not trust the coach and I don't believe they are a very good coach it's a negative effect because I won't do new things that they ask me to do because I don't believe they can take me through the process to get the new dive. I've has many coaches in my time. Some coaches have got a massive amount out of me and I have masses of respect for them, and I think they're amazing and suddenly we jelled. And there are other coaches that are very nice people and I have a lot of time for them but do not think they are a good coach and don't believe what they are saying to me is correct. So yeah coaches definitely affect the positivity of going for things, and make it seem easier than it is. So if you take the coaches I've got on with its because I think they are an exceptionally good coach and I've driven forward, where as another coach who is supposedly a high level coach I just didn't get on with and didn't believe they were very good at coaching so I didn't progress and I found learning new dives with that person exceedingly scary whereas with the other person. Well with the male coach it was, I would trust whatever he said and it worked every time.

Researcher - How did your parents affect your diving at the time?

Tony - They were very supportive, they affected it in exceptionally good ways. My mum took me everywhere, did all the travelling, and was always there on poolside watching but never gave diving advice or coaching advice. She was just there. Not really massively encouraging but nor discouraging, she just took an interest.

Researcher - How did your peers and teammates affect your diving at the time?

Tony - The way I learnt dives, they made me more kamikaze, more have I done enough lead ups oh what the hell they've just done it so I must be able to do it. Which was scarier but you've just seen them do it so you're doing to do it. Whatever happens they can't progress quicker than me they cant have that dive when I should be able to do it. But also it depends on the team mates but most of the team mates but most of the team mates I've ever had have been very supportive and very, have been cheering you on to get the new dives as well. So if you've done a dive that they're not doing they are

still cheering you on and you are cheering them on so its sort of you are both willing each other to get progress. And that makes it easier and less scary, you believe you can do it. When they are helping you and cheering you on your self-belief is higher, if you've seen them do it you definitely believe you can do it to or even if you see them try it and bail out of it or hurt themselves so you've got a sneaky thing thinking he can't do it so I'm going to do it and show him how to do it. Whereas it works the other way round, you bail out, then they do it and you think hang on a minute he's just done it so I've got to get up and do it. So it doesn't make it any less scary it just give you more will power to go it's going to go whether you like it or not I'm going to give it a go. There's the competition inside you wants to not loose even though its not a competition just you cant loose that little fight, you cant loose that little competition, it doesn't mean anything but they cant get it, I'm going to get it and say ha I've got one up on you.

Interview Two – Martin

Martin was interviewed via video call on an evening to fit around his work. The interview lasted 27 minutes.

Researcher - Describe an experience when you struggle to perform a dive?

Martin – When I was first pushed on to 3m, and I had to go and do back 1 ½. So I was stood there, I could do all my lead ups on 1m and they were absolutely fine, I mean as good as I was going to possibly do it. Everybody said it was ok, I visualised it and everything, I'd done all my lead ups on 3m, the back dives and even summersaults and stuff. Then I got up on the board and as soon as I told myself im going to do it now, or someone had said ok this time. Id stand there and my legs would shake and I would get nervous. I wouldn't be able to do anything. I would either chicken out and stand there for ages or just do a back summersault. It was just irrational because, I wasn't sure if I was scared of going over, going short, worried about hurting myself, scared of hitting the board on backwards which id never done before. I just started to be scared of irrational things.

Researcher - What was the main reason you struggled to perform the dive?

Martin - Fear! The main thing that stopped me learning new dives was being scared of not knowing what was going to happen when I tried a dive for the first time.

Researcher - What physical feelings did you experience at the time?

Martin - Its hard to say, I suppose you could call it a sickness, like you are stood on the board and you are so nervous, I don't think you would ever be sick but you feel sick. Stood on the board you start to feel nervous, if you are stood there too long the nerves can turn into dizziness, you feel a bit sick. The biggest one was legs shaking, my muscles would start twitching back and forth, my knees would go weak and that's when you loose parts of your strength in your muscles. That was probably the biggest part that came out of the fear.

Researcher - How did you feel emotionally?

Martin - Frustration was the biggest one, because you know you can do it but you get annoyed with yourself that you're not actually trying it. (when didn't do a dive)
Disappointed and angry.

Researcher - How did you get over those feelings?

Martin - A lot of practise. A lot of preparation. Beating myself up outside of the pool, to say if I don't do it what's the point of diving anymore. It worked to a point; the best thing that worked was quitting diving for three years then coming back.

Researcher - Who inspired you during that time?

Martin - The guys in the group I was diving against a lot of the time, being mid to lower half of the table makes you want to be better. You are constantly seeing them and they are advancing a lot.

Researcher - How do you think your coaches affected your diving at the time?

Martin - They had a direct affect on it, whether it was positive or negative depended on the scenario. There were lots of occasions that they would be really supportive and positive and that was the reason I would go for a dive was through their motivation. The other way was, you could argue one of the reasons I wasn't going for it was through preparation which was I suppose managed by them, that made me scared of it. Like doing exercises or lead ups in one particular method, like just doing them on 1m then saying go up and do it, with no external alternative methods of doing it, would probably be the main example. Rushing through one method of doing lead ups, one approach to lead ups as appose to say putting me in the gym or a rig or various things like that. The first time I was taught to do visualisation, before that I would just go for it and either do it or if I was scared then I was scared and I had no way of getting over it but being taught how to do visualisation was really good. It meant I could prep it throughout the day, every day of the week, and think about how it should be done so that when id came to do it all I was thinking about was the right way to do it as appose to the wrong way.

Researcher - How did your parents affect your diving at the time?

Martin - Good and bad. Realistically they were always supportive, and motivating it. Sometimes they didn't understand, they understood what I should be doing or not doing in the dive but they didn't understand the fears and emotions attached to it.

Researcher - How did your peers and teammates affect your diving at the time?

Martin - In the early stages, really positive, because there was a reasonable size group of us at the same level so we were competing and pushing each other. A bit later on it was a bit more difficult because there as less at the same level so it was more me diving against myself as appose to more of a competition. I am very competitive driven, even if it just means doing this dive better or first. Once that went the motivation of doing the new things dropped a bit.

Interview Three – Kathryn

Kathryn was interviewed via video call during the day to fit around her work. The interview lasted 24 minutes.

Researcher - Describe an experience when you struggle to perform a dive?

Kathryn - When I was 12 or 13, I was at skills level and could do the whole list, and suddenly I just wouldn't go off the boards backwards. I would completely refuse to a point where my coach would hold my hips and hang me off backwards and I would just scream. I have no idea why that happened but it was definitely a massive mental block. I also got stuck on reverse. I just thought I cant, I cant, its just wasn't physically possible. I found it really really hard. I used to lean so far because I thought I was going to hit the poolside. I would rather jump out and land on my back than bring it in and actually get more spin. And mentally it always helped if Bob was standing behind me, he must have spanned me on that dive over three hundred times, at least, before I just went up on 1 metre and did it because it was just too hard on poolside.

Researcher - What was the main reason you struggled to perform the dive?

Kathryn - I just completely lost my confidence, I was going to quit because I couldn't go backwards anymore. I couldn't even work out how to do it, I was definitely a mental block because I couldn't think I through anymore.

Researcher - What physical feelings did you experience at the time?

Kathryn - I don't know. If you don't go for a dive I would feel physically in pain. I didn't feel sick I was always quite calm but moody.

Researcher - How did you feel emotionally?

Kathryn - I used to get so so so frustrated, that was the main problem with me I would get so frustrated. I would get frustrated at Bob and everyone around me. Sport is supposed to be a stress relief that helps you and makes you feel better, but I would get so worked up about it. I wear my emotions on my face, I cant hide them. More than anything it was frustration. Sometimes when I didn't get comments after a dive I would get so annoyed because he was concentrating on other people and there was just no balance. With myself I was very determined, if I was asked to do a dive I would go up on the board and do it, I would feel better going up and landing on my back than going

home having not done the dive. I rather go and hurt myself than go home frustrated that I hadn't done it. I know that's a weird mentality but that is always how I worked.

Researcher - How did you get over those feelings?

Kathryn - It took me ages of just forcing myself to do it. I don't know how I got over it. I just got to the point where I thought this is getting ridiculous I'm going to have to stop diving or go and do the dive. I gave myself an ultimatum. It was important to go backwards again.

Researcher - Who inspired you during that time?

Kathryn - I don't know. When we used to go and compete in Leeds and see some of the top athletes, like Rebecca Gallentree. I would just watch them train when we would go to do work in the bubbles there. That definitely inspired me so much. Definitely not (*a highly ranked diver in her club*)

Researcher - How do you think your coaches affected your diving at the time?

Kathryn - Oh god. Well it depended who was coaching me, to who could get the best out of me. If I had Tina I would refuse, but Bob didn't do too badly to be fair. I knew Bob had been there, he had done diving, he understood how I felt and how I worked. But Tina I felt had no idea, she had been at that level in her own sport but I just felt she did know enough about diving and I sometimes felt like I knew more than she did, and she was supposed to be coaching me.

Researcher - How did your parents affect your diving at the time?

Kathryn - They used to sit in the corner, they liked to watch but didn't want to have anything to do with the poolside. My brother was under 8 so they had to stay on poolside for him. They were always very relaxed. They never pushed me but were always very pleased with me when I did well. They would always show they were so proud of me after a competition. I think they were really good and had a good balance.

Researcher - How did your peers and teammates affect your diving at the time?

Kathryn - I grew up diving with one of my best mates, me and Lindsey are still so close now. So that helped so much. Especially towards the end, when all the new generation came through they were all so young and having someone your own age makes it so much better. Its hard when you are the oldest. Me and my brother used to drive each other mad, but he did push me on.

Meaning Units, Themes and Sources

Meaning Units	Themes	Source of Self-Efficacy
Poor landings/splats	Loss of Control	Mastery Experience
Loss of spatial awareness	Preparatory Skills	
Unknown Outcome		
Interruption of Thought		
Process		
Felt Better after Lead-ups		
Wanted to do more lead-ups		
Physical preparation		
Visualisation	Learned Skills	Vicarious Experience
Modeling		
Self-talk		
Adapting Equipment		
Lack of Attention	Poor Coaching	Social Persuasion
Rushing the Diver	Teammates	
Lack of Variety in Coaching	Good Coaching	
Style		
Lack of Coaches Diving		
Knowledge		
Lack of Belief in Coaches		

Ability
 Good Company
 Encouragement
 Healthy Competition
 Emotional Support
 Coaches experiences as a
 diver
 Bond of Trust
 Expert knowledge
 Emotional Support

Nervous	Emotions	Physiological and
Petrified	Physical Sensations	Emotional States
Scared		
Fear		
Frustration		
Tears		
Self-hatred		
Embarrassed		
Disappointment		
Angry		
Stressed		
Muscle Spasms		
Sickness/Nausea		
Lethargy		
Dizziness		
Pain		

Sources of Self-Efficacy with Raw Data Examples

Source	Definition	Raw Data Example
Mastery Experience	Confidence gained following previous success and lack of confidence	“A lot of practise. A lot of preparation”

	following failure	“I would always want to do more lead ups than necessary to convince myself I can do it, keep doing lead ups, really overdo the lead ups”
Vicarious Experience	Confidence gained from watching and copying others or imagining oneself performing an action, either in person or indirect methods such as videos	“the top athletes, like Rebecca Gallentree. I would just watch them train” “visualisation was really good”
Social Persuasion	Positive or negative confidence gained from others, such as teammates, coaches or audiences	“Tina I felt had no idea, she had been at that level in her own sport but I just felt she did know enough about diving and I sometimes felt like I knew more than she did, and she was supposed to be coaching me” “he can’t do it so I’m going to do it and show him how to do it”
Physiological and Emotional States	The effect of physical indicators on self-efficacy beliefs, such as heart rate, fatigue and pain, whereas emotional states refers to the effect of emotion on self-efficacy beliefs, for example fear, joy or self-doubt	“Frustration was the biggest one, because you know you can do it but you get annoyed with yourself that you’re not actually trying it” “Petrified, shaking, nothing worked, lethargic”

Professional Profiles

Member Checking

Psychology professional. She holds a senior lecturing post at the University of Sunderland. Her major research interests are psychology, physical exercise and health. She gave detailed written comments on the interview questions via email.

Diving professional. He has been coaching for eight years for two separate clubs within the northeast region, and is currently holds the position of head coach. He holds a UK coaching certificate level two in diving coaching. He dived himself to international level within the masters diving community, attending international diving events between 2004 and 2007. In addition to this he also competed in senior events, achieving podium placements against divers half his age at national and international senior events. Due to the time constraints of his job commitments he was able to give comments and approval for the interview questions via email.

Independent coder. He holds a senior lecturing position with the University of Sunderland. His major research interests are psychology, physiology and sport. He is currently undertaking research with children and adolescents so can offer insight into the implementation aspects of the project. He offered independent coding of interview transcripts.

Screening Questions

1. Have you experienced mental block or barriers in your diving?
2. Did any periods of block affect your diving progression?

Recruitment Email

Dear Coach

As part of research into the relationship between self-efficacy and performance in diving, I am conducting research investigating the effects of mental block and psychological barriers on divers performance. I am looking to recruit retired elite divers who have experienced mental block or psychological barriers within their diving career. They will be interviewed via video call at their convenience and asked to discuss their diving experience and any experiences of psychological barriers. This research will help

progress a study into the potential performance enhancing aspects of self-efficacy in diving. If you have contact with any retired elite divers you think would be suitable for the study please pass on this email and asked them to contact me directly. Thank you for your time.

Kindest Regards

Emily Pattinson

Sport Psychology Researcher

University of Sunderland

Participant Pack

Participant Information Sheet

Study Title: Self-efficacy and mental block in diving: A reflective case study

What is the purpose of the study?

The study is part of my PhD thesis in the department of Sport and Exercise Science, University of Sunderland. The purpose of this study is to gain greater understanding of mental block and psychological barriers to diving performance.

Why have I been approached?

You have been contacted because you are a retired elite diver over the age of 18 years.

Do I have to take part?

All participation is voluntary, and any participant has the right to withdraw themselves for during and up to 3 weeks after participation.

What will happen to me if I take part?

Participants will be invited to be interviewed via video call to talk about their experiences as a diver, and their experiences of mental block or psychological barriers.

What are the possible disadvantages and risks of taking part?

You will be asked to discuss times of difficulty or injury, which may cause slight emotional distress

What are the possible benefits of taking part?

You will be helping to gain further insight into psychology in diving, and assisting the development of further research.

Will my taking part in this study be kept confidential?

All information obtained will be anonymised, and all consent forms will be kept in a secure locked cabinet away from interview documentation.

What will happen to the results of the research study?

The results will be analysed and presented as part of a PhD thesis submitted to the University of Sunderland. Results may also be used as part of peer reviewed journal articles and conference presentations.

No participant will be identifiable in the thesis but if you change your mind about your data being included in the study, as long as you contact us within three weeks of testing taking place, the data can be removed entirely.

Who is organising and funding the research?

The research is organised by Emily Pattinson who is doctoral student at the University of Sunderland, Department of Sport and Exercise Science. This project is not externally funded.

Who has reviewed the study?

A departmental subcommittee of the University of Sunderland Research Ethics Committee has reviewed and approved the study.

Contact for further information

Emily Pattinson (email: bg54wm@student.sunderland.ac.uk)

Dr Sandra Leyland (Project Supervisor)

Email: sandra.leyland@sunderland.ac.uk

Phone: (0)191 515 3841

Dr Etta Evans (Chairperson of the University of Sunderland Research Ethics Committee)

Email: etta.evans@sunderland.ac.uk

Phone: 0191 515 2624

Participation Consent Form

Study title: Self-efficacy and mental block in diving: A reflective case study

Participant code: _____

- I am over the age of 18 years
- I am a retired elite diver
- I have read and understood the attached study information and, by signing below, I consent to participate in this study.

- I understand that I have the right to withdraw from the study without giving a reason at any time during the study itself.
- I understand that I also have the right to change my mind about participating in the study and can contact the researcher to have my data withdrawn from the study (within 3 weeks of participating)

Signed: _____

Print name: _____

Date: _____

This appendix details the audit trail for study three which aimed to develop and validity test a diving specific self-efficacy scale, as well as study four which used the same data to investigate the hierarchy of the sources of self-efficacy and links to ability level in diving. The contents of this audit trail are detailed below:

1. Professional profiles for Content Analysis
2. Recruitment Email
3. Second Test Reminder Email
4. Participant Information Pack
5. Physical Activity Appraisal Inventory (PAAI)
6. Permission to use PAAI
7. Revised Competitive State Anxiety Inventory – 2 (CSAI-2R)

Professional Profiles for Content Analysis

Four professional diving coaches and two research professionals for the area of sport psychology were involved in the development and content checking of the DIVE-SE scale.

Diving Coach 1. He has been coaching for six years for two separate clubs across the north east of England. He currently holds a UK coaching certificate level two in diving coaching, and also holds a UK coaching certificate level two in trampolining coaching. He has coached from learn to dive level up to regional age group level, and has started grass root learn to dive programmes across the north of England. He dived to a national age group level himself in his youth and moved to national masters level shortly after he took up coaching. He offered detailed written comments via email.

Diving Coach 2. He has been coaching for ten years for two separate clubs within the northeast region, and is currently holds the position of head coach of a club situated within this region. He holds a UK coaching certificate level two in diving coaching and has been invited onto the programme to be one of the first in the country to complete the new UK coaching certificate level three in diving coaching. He came to diving later than average and did not begin diving until later life. He began coaching shortly after taking up diving, he coached for his local club for several years, and he is still currently working as a full time diving coach. He dived himself to international level within the masters diving community, attending international diving events between 2004 and 2007. In addition to this he also competed in senior events, achieving podium placements against divers half his age at national and international senior events. Due to the time constraints of his job commitments he was able to give limited comments and approval via email.

Diving Coach 3. She has been coaching for thirteen years for six different clubs across the UK. She has held several different positions within these organisations including assistant coach, talent identification coach and head coach. She holds a UK coaching certificate level two in diving coaching. She is an ex-diver who competed at junior, senior and masters level for over twenty years, and held national titles in all three of these levels. In addition to her coaching and diving achievements, she has also sat on several national and international diving committees and has been involved in

diving policy making for several years. DP003 gave detailed comments verbally during a meeting for a different matter.

Dividing Coach 4. He has been coaching for four years within one organisation in the southwest of England. He holds the position of assistant coach at a small grass roots learn to dive centre with a small competitive group. He has a UK coaching certificate level one and has coached divers to low-level regional events. He is also a diver himself, competing at junior, senior and masters level, achieving national and international titles during his diving career. Although he is relatively new to coaching he offers an insight into the lower level of diving and how beginner divers will interpret the scale. He gave detailed written comments via email.

Sport Psychologist 1. She holds a senior lecturing post at further education level. Her major research interests are psychology, physical exercise and health. However she has previously been involved in research projects that generated self-efficacy scales so offers a unique position in several different research aspects. She gave detailed written comments via email.

Sport Psychologist 2. He also holds a senior lecturing position within further education. His major research interests are physiology and sport. He is currently undertaking research with children and adolescents so can offer insight into the implementation aspects of the project. He gave simple written approval via email.

Recruitment Email

Hello All,

As some of you may know I am currently half way through my PhD research into self-efficacy (self belief) in divers. I have developed a new questionnaire that I am hoping will be able to measure self-efficacy in adult and adolescent divers. This will then be able to help further research into assisting young athletes with confidence problems and hopefully go towards reducing drop out rates in adolescent divers.

As part of my study I need to validity check my questionnaire, and this is why you have been contacted. I am looking for organisations and diving clubs that would be interested in passing on my online survey to their members who are over the age of 12 years

(including adult divers). Involvement will entail filling in an online survey, all responses will be completely confidential.

The scale has received ethical approval from my university. If you would be interested in taking part in this study please let me know, also I would appreciate if you could pass this on to any other diving clubs you think would be interested. I anticipate the study will begin in November 2015.

Kindest Regards
Emily Pattinson

Second Test Reminder Email

Dear Participant

Thank you so much for your involvement in our research to investigate the effects of self-efficacy (self-belief) on diving performance and drop out. We aim to get a better understanding of self-efficacy's effects on diving to allow divers to receive more support with they are struggling, which will hopefully improve performance and reduce drop outs.

To get a true test if the scale it must be able to identify self-efficacy changes over time, this is why you are being invited to complete the survey a second time.

You will not be contacted again after the completion of the second survey. If you do not wish to complete the survey a second time simply reply to this email with 'no more contact' in the subject line.

Thank you again for your help. Please find below the link and your unique word.

Regards
Emily Pattinson

Survey Link

<https://www.surveymonkey.co.uk/r/DSES2>

Unique Word

Test

Participant Pack

Adult Participant Information Sheet

Study Title: Development and Validation of the Diving Self-Efficacy Scale

What is the purpose of the study?

The study is part of a PhD thesis in the Department of Sport and Exercise Science, University of Sunderland. The purpose of this study is to develop a questionnaire to measure self-efficacy for diving. Self-efficacy refers to a person's belief in their ability to perform a task or cope with a situation.

Why have I been approached?

You have been contacted because you are a diver over the age of 16 years.

Do I have to take part?

All participation is voluntary, and any you have the right to withdraw yourself at any time during and up to 3 weeks after participation. To withdraw during the study simply close the browser window, to withdraw for up to 3 weeks after participation simply email your unique reference number to the researcher and they will remove your data. After two weeks a prompt email will be sent. If there is still no response we will assume you do not wish to participate and you will not be contacted again.

What will happen to me if I take part?

Participants will be invited to complete a set of questionnaires online.

The information gained will be completely anonymous. Details of the online questionnaires will be emailed to you via your diving club, no email addresses will be shared with researchers.

Completion of the questionnaires should take no longer than 10 minutes each. You will be asked if you would be willing to complete the questionnaires again 2 weeks later. This is to double check if the measure is providing accurate results. You will be emailed a

unique reference number that you enter when filling in the second set of questionnaires, which will help us to compare your second set of responses with your first. To allow us to do this you will be asked to enter an email address. This is completely voluntary and the email address will not be stored with your results. It will be deleted on receipt of your completed questionnaires. The link to access the scales online can be found below.

<https://www.surveymonkey.com/r/divingSEscale>

What are the possible disadvantages and risks of taking part?

There are no disadvantages or risks involved in taking part.

What are the possible benefits of taking part?

You will be helping to gain further insight into self-efficacy in diving, and assisting the development of further research.

Will my taking part in this study be kept confidential?

All information obtained will be anonymised, and all of your responses will be kept in a secure in password protected electronic files and printed material will be kept in a locked cabinet. The data collected will not include any information that can identify participants. We will be collecting details of your age and gender but no names or addresses will be collected. All anonymised data will be accessible via password protection known only to the researchers. It may be that appropriate members of the University of Sunderland may be given access to this anonymised data for monitoring or audit of this study to ensure that we are complying with University standards and regulations.

What will happen to the results of the research study?

The results will be analysed and presented as part of a PhD thesis submitted to the University of Sunderland. Results may also be used as part of peer reviewed journal articles and conference presentations.

No participant will be identifiable in the thesis but if you change your mind about your data being included in the study, as long as you contact us within three weeks of testing taking place, the data can be removed entirely.

Who is organising and funding the research?

The research is organised by Emily Pattinson who is doctoral student at the University of Sunderland, Department of Sport and Exercise Science. This project is supervised by Dr Sandra Leyland and Dr David Archer and is not externally funded.

Who has reviewed the study?

The University of Sunderland Research Ethics Committee has reviewed and approved the study.

Contact for further information

Emily Pattinson (email: bg54wm@student.sunderland.ac.uk)

Dr Sandra Leyland (Project Supervisor)

Email: sandra.leyland@sunderland.ac.uk

Phone: (0)191 515 3841

Dr Etta Evans (Chairperson of the University of Sunderland Research Ethics Committee)

Email: etta.evans@sunderland.ac.uk

Phone: 0191 515 2624

Parent Information Sheet

Study Title: Development and Validation of the Diving Self-Efficacy Scale

What is the purpose of the study?

The study is part of a PhD thesis in the Department of Sport and Exercise Science, University of Sunderland. The purpose of this study is to develop a questionnaire to measure self-efficacy for diving. Self-efficacy refers to a person's belief in their ability to perform a task or cope with a situation.

Why has my child been approached?

You have been contacted because you are the parent of a diver between the ages of 12 – 15 years.

Does my child have to take part?

All participation is voluntary, and any you have the right to withdraw your child at any time during and up to 3 weeks after participation. It is important that participants under the age of 16 know they have the right to withdraw themselves at any point without incurring any penalties. For your child to withdraw during the study they simply close the browser window, to withdraw your child for up to 3 weeks after participation simply email their unique reference number to the researcher and they will remove their data. Please take a few moments to explain the purpose of the study, what it involves and the right to withdraw to your child. We do intend to ask all child participants to acknowledge their willingness to participate by providing assent. After two weeks a prompt email will be sent. If there is still no response we will assume you do not wish to participate and you will not be contacted again.

What will happen to my child if they take part?

Participants will be invited to complete a set of questionnaires online.

The information gained will be completely anonymous. Details of the online questionnaires will be emailed to you via your diving club, no email addresses will be shared with researchers.

Completion of the questionnaires should take no longer than 10 minutes each. After completion of the first test you will be asked if you would be willing for your child to complete the questionnaires again 2 weeks later. This is to double check the if measure is providing accurate results. You will be emailed a unique reference number that you enter when filling in the second set of questionnaires, which will help us to compare your child's second set of responses with your first. To allow us to do this you will be asked to enter an email address. This is completely voluntary and the email address will not be stored with your results. It will be deleted on receipt of your completed questionnaires. The link to access the scales online can be found below.

<https://www.surveymonkey.com/r/divingSEscale>

What are the possible disadvantages and risks of taking part?

There are no disadvantages or risks involved in taking part.

What are the possible benefits of taking part?

You will be helping to gain further insight into self-efficacy in diving, and assisting the development of further research.

Will my child taking part in this study be kept confidential?

All information obtained will be anonymised, and all of your child's responses will be kept in a secure in password protected electronic files and printed material will be kept in a locked cabinet. The data collected will not include any information that can identify participants. We will be collecting details of your child's age and gender but no names or addresses will be collected. All anonymised data will be accessible via password protection known only to the researchers. It may be that appropriate members of the University of Sunderland may be given access to this anonymised data for monitoring or audit of this study to ensure that we are complying with University standards and regulations.

What will happen to the results of the research study?

The results will be analysed and presented as part of a PhD thesis submitted to the University of Sunderland. Results may also be used as part of peer reviewed journal articles and conference presentations.

No participant will be identifiable in the thesis but if you change your mind about your data being included in the study, as long as you contact us within three weeks of testing taking place, the data can be removed entirely.

Who is organising and funding the research?

The research is organised by Emily Pattinson who is doctoral student at the University of Sunderland, Department of Sport and Exercise Science. This project is supervised by Dr Sandra Leyland and Dr David Archer and is not externally funded.

Who has reviewed the study?

The University of Sunderland Research Ethics Committee has reviewed and approved the study.

Contact for further information

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Dr Sandra Leyland (Project Supervisor)

Email: sandra.leyland@sunderland.ac.uk

Phone: (0)191 515 3841

Dr Etta Evans (Chairperson of the University of Sunderland Research Ethics Committee)

Email: etta.evans@sunderland.ac.uk

Phone: 0191 515 2624

Child Participant Information Sheet

Study Title: Development and Validation of the Diving Self-Efficacy Scale

What is the purpose of the study?

The study is part of a PhD thesis in the Department of Sport and Exercise Science, University of Sunderland. The purpose of this study is to develop a questionnaire to measure self-efficacy for diving. Self-efficacy refers to a person's belief in their ability to perform a task or cope with a situation.

Why have I been approached?

You have been contacted because you are a diver between the age of 12 and 15 years.

Do I have to take part?

All participation is voluntary, and you have the right to stop at any point and can have your answers removed up to 3 weeks after by contacting the researchers. If you decide you want to stop simply close the browser window, if you change your mind after you have finished just ask your parents to email the research team and your answers can be deleted for up to 3 weeks after you submitted them. After two weeks a prompt email will be sent. If there is still no response we will assume you do not wish to participate and you will not be contacted again.

What will happen to me if I take part?

Participants will be invited to complete a set of questionnaires online.

The information gained will be completely anonymous. Details of the online questionnaires will be emailed to your parents or guardians by your diving club, no email addresses will be shared with researchers.

Completion of the questionnaires should take no longer than 10 minutes each. After you have finished you will be asked if you would be willing to complete the questionnaires again 2 weeks later. To be involved in this you will be given a unique reference number and asked to enter an email address, please make sure this bit is completed by your parent or guardian.

What are the possible disadvantages and risks of taking part?

There are no disadvantages or risks involved in taking part.

What are the possible benefits of taking part?

You will be helping to gain further insight into self-efficacy in diving, and assisting the development of further research.

Will my taking part in this study be kept confidential?

All information obtained will be anonymised and kept in a secure and password protected electronic files and printed material will be kept in a locked cabinet. You will not be able to be identified from your answers. We will be collecting details of your age and gender but no names or addresses will be collected. All anonymised data will be accessible via password protection known only to the researchers. It may be that appropriate members of the University of Sunderland may be given access to this anonymised data for monitoring or audit of this study to ensure that we are complying with University standards and regulations.

What will happen to the results of the research study?

The results will be analysed and presented as part of a PhD thesis submitted to the University of Sunderland. Results may also be used as part of peer reviewed journal articles and conference presentations.

No participant will be identifiable in the thesis but if you change your mind about your data being included in the study, as long as you contact us within three weeks of testing taking place, the data can be removed entirely.

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Phone: (0)191 515 3841

Dr Etta Evans (Chairperson of the University of Sunderland Research Ethics Committee)

Email: etta.evans@sunderland.ac.uk

Phone: 0191 515 2624

Physical Activity Appraisal Inventory

Directions: Using the 0-100 scale below, please rate how sure you are that you can perform your usual physical activities **regularly** under the following conditions. Physical activity refers to **all** activity at home, work, or leisure.

0 10 20 30 40 50 60 70 80 90 100

Cannot Moderately Certain

do at all certain can do can do

I am confident that I can perform my usual physical activities (includes **all** activity at home, work, or leisure): (0-100)

When I am feeling tired _____

When I am feeling pressure from work or school _____

During bad weather _____

During or after experiencing personal problems _____
When I am feeling depressed _____
When I am feeling anxious _____
When I feel physical discomfort with an activity _____
When I have too much work to do at home _____
When I/we have visitors _____
When there are other interesting things to do _____
When I don't have support from my family or friends _____
When I have other time commitments _____
When I do not feel well _____

Haas, B.K & Northam, S (2010) Measuring self-efficacy: Development of the physical activity assessment inventory, *Southern Online Journal of Nursing Research, Special Issues: Psychometrics*, 10(4)

Permission to use PAAI

from: Barbara Haas <bhaas@uttyler.edu>
to: Emily Pattinson <bg54wm@student.sunderland.ac.uk>
date: 30 October 2015 at 12:25
subject: RE: Sport Self-Efficacy scale

Dear Emily,

Certainly you have my permission to use the PAAI. Do you have a copy of it?

Best wishes as you begin your research,

Barbara

Barbara K. Haas, PhD, RN
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Revised Competitive State Anxiety Inventory – 2 (CASI-2R)

Revised Competitive State Anxiety Inventory – 2 (CASI-2R)

Directions: A number of statements that athletes have used to describe their feelings before competition are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate *how you are feeling right now – at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement, but choose the answer that describes your feelings *right now*.

		Not At All	Some- what	Mode- rately So	Very Much So
1	I feel jittery	1	2	3	4
2	I am concerned that I may not do as well in this competition as I could	1	2	3	4
3	My body feels tense	1	2	3	4
4	I feel self-confident	1	2	3	4
5	I am concerned about losing	1	2	3	4
6	I feel tense in my stomach	1	2	3	4
7	I am concerned about choking under pressure	1	2	3	4
8	I'm confident I can meet the challenge	1	2	3	4
9	I'm concerned about performing poorly	1	2	3	4
10	My heart is racing	1	2	3	4
11	I'm confident about performing well	1	2	3	4
12	I feel my stomach sinking	1	2	3	4
13	I'm concerned that others will be disappointed with my performance	1	2	3	4
14	My hands are clammy	1	2	3	4
15	I'm confident because I mentally picture myself reaching my goal	1	2	3	4
16	My body feels tight	1	2	3	4
17	I'm confident of coming through under	1	2	3	4

	pressure				
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Cox, R.H, Martens, M.P & Russell, W.D (2003) Measuring anxiety in athletics: The Revised Competitive State Anxiety Inventory-2, *Journal of Sport and Exercise Psychology*, 25, 519-533.

This appendix details the audit trail for study five which aimed to investigate if self-efficacy is a predictor of competition performance in age group divers. The contents of this audit trail are detailed below:

10. Recruitment Email
11. Follow Up Email
12. Participant Information Pack
13. Testing Pack

Recruitment Email

Hello All,

First I would like to say thank you for your continued support for my research into diving performance and self-efficacy. Following your involvement I have successfully developed a diagnostic measure for self-efficacy in divers.

I am now developing diving specific psychological interventions to hopefully improve diving self-efficacy and overall diving performance. As part of this research I am looking to recruit diving clubs interested in becoming involved in either or both of the following studies.

The next stage of my research is split into two studies:

Study 1: The links between self-efficacy and performance in age group divers

For this study I hope to recruit a group of age group divers who have qualified for and are attending this years NAG's.

The test will require them to answer a short questionnaire 2 weeks before their event, 2 hours before their event and 2 weeks after their event.

Their coach will be asked to rate their performance from 1 - 10 at the same intervals.

Their qualifying score and achieved NAG score will be taken as a measure of their performance.

Estimated Start Date: 20th June 2016

Study 2: Can physiological psychology interventions improve self-efficacy and performance in divers

For this study I hope to recruit a group of divers at age group or junior elite level. This study is not based around a competition and is an intervention study based around their current training. This study will be based at their training centre and will not require any travelling, researchers will attend training sessions to administer the tests. All timings to be negotiated with coaching staff.

- Divers will be placed in groups based on different interventions and asked to complete a 6 week psychological programme. With baseline and subsequent testing at 2 weeks, 4 weeks, 6 weeks and 8 weeks.
- Coaches will be asked to provide feedback on their divers training performance and psychological wellbeing at the same intervals
- Parents will be asked to provide feedback on their child's training performance and psychological wellbeing at the same intervals
- Baseline tests of performance will be taken and then repeated after the intervention is complete, divers will be asked to perform a series of dives (appropriate to their level) and judged by a national level judge. They will not be made aware of the scores they are given.

Estimated Start Date: 1st August 2016

If you and your diving club are interested in becoming involved in this research or would like further information please contact me on the details below.

Kindest Regards

Emily Pattinson

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[@EmilyPatPsyc](#)

Follow Up Email

Hello,

Thank you for your interest. I have attached the information sheet for you and (Child's Name) to read. The study is fairly simple. (Child's Name) will be asked to fill in a short 5

minute questionnaire 4 times. 2 weeks prior to Nationals, 2 hours prior to her/is event, 2 hours after her/is event and 2 weeks after Nationals.

Her/is coach will be asked to fill in a one question questionnaire, at the same time frames (the coach will not be made aware of any of (Childs name) score or vice versa). Also her/is qualifying score and achieved score will be recorded.

To register for the study i will need to information below:

Name of diver

Age group

DOB

Club

Coach

Qualifying score's for 1m, 3m and/or Platform

Please find below the link for the first questionnaire, your child will fill in the same questions 4 times.

<https://www.surveymonkey.co.uk/r/N6HTGMZ>

Kindest Regards

Emily Pattinson

[Sport Psychology Researcher](#)

[University of Winchester](#)

[07833150601](tel:07833150601)

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Participant Information Pack

Study Title: Self-Efficacy and Competitive Performance in Springboard and Highboard Divers

What is the purpose of the study?

The study is part of a PhD thesis in the Department of Sport and Exercise Science, University of Winchester. The purpose of this study is to investigate the links between self-efficacy and competitive performance in divers. Self-efficacy refers to a person's perceptions about their ability to perform a task; the study will focus on these perceptions rather than actual ability.

Why have I been approached?

You have been contacted because you are a diver/parent of a diver who has qualified for the National Age Group Championships 2016.

Do I have to take part?

All participation is voluntary. Any participant has the right to withdraw from to study without offering a reason. To withdraw during the study simply express to the researcher you would no longer like to be involved. To withdraw after your participation email your unique reference number to the researcher and your data will be removed.

What will happen to me if I take part?

Divers will be asked to fill in a short questionnaire four times, 2 weeks before they compete in National Age Groups, 2 hours before their event, 2 hours after their event and finally 2 weeks after the event. The testing pre and post event will take place online and the testing on the day of the event will take place on a tablet computer. These testing sessions will not interfere with the divers training and will be organised at a time that suits the divers training schedual for the event.

Coaches will also be asked to fill in a one question rating of their divers performance at the same time intervals.

The Divers competition scores from qualifying events and National Age Groups will be recorded

Scores on the questionnaires will not be shared with divers or coaches.

What are the possible disadvantages and risks of taking part?

Divers may become more aware of their self-efficacy beliefs, which could have an effect on their behaviour. Support will be offered to divers and coaching staff to discuss any issues that may arise from the study.

What are the possible benefits of taking part?

This research hopes to shed more light onto the potential effects of self-efficacy on performance and act as a starting point for the development of diving specific self-efficacy interventions.

Will my taking part in this study be kept confidential?

All information obtained will be anonymised, and all of your responses will be kept in a secure in password protected electronic files and printed material will be kept in a locked cabinet within the Sport and Exercise Department at the University of Winchester. The data collected will not include any information that can identify participants. We will be collecting details of your age and gender but no names or addresses will be collected. All anonymised data will be accessible via password protection known only to the researchers. It may be that appropriate members of the University of Winchester may be given access to this anonymised data for monitoring or audit of this study to ensure that we are complying with University standards and regulations.

What will happen to the results of the research study?

The results will be analysed and presented as part of a PhD thesis submitted to the University of Winchester. Results may also be used as part of peer reviewed journal articles and conference presentations.

No participant will be identifiable in the thesis but if you change your mind about your data being included in the study, as long as you contact us within three weeks of testing taking place, the data can be removed entirely.

Who is organising and funding the research?

The research is organised by Emily Pattinson who is doctoral student at the University of Winchester, Department of Sport and Exercise Science. This project is supervised by Dr Stewart Cotterill and is not externally funded.

Who has reviewed the study?

The University of Winchester Research Ethics Committee has reviewed and approved the study. Ethics Application number BLS/16/03

Contact for further information**Emily Pattinson**

Primary Researcher

Emily.Pattinson@winchester.ac.uk

07833150601

Dr Stewart Cotterill

Research Supervisor

Stewart.Cotterill@winchester.ac.uk

+44 (0)1962 827296

Participation Consent Form

Study title: Self-Efficacy and Competitive Performance in Springboard and Highboard Divers

Participant code: _____

- I am over the age of 18 years and/or the legal parent/guardian of the participant
- I have read and understood the attached study information and, by signing below, I consent to participate in this study.
- I understand that I have the right to withdraw from the study without giving a reason at any time during the study itself.
- I understand that I also have the right to change my mind about participating in the study and can contact the researcher to have my data withdrawn from the study (within 3 weeks of participating)

Signed: _____

Print name: _____

Date: _____

Participation Assent Form

Study title: Self-Efficacy and Competitive Performance in Springboard and Highboard Divers

Participant code: _____

- I am a diver who has qualified for the National Age Group Championships 2016
- I have read and understood the attached study information and, by signing below, I consent to participate in this study.
- I understand that I have the right to withdraw from the study without giving a reason at any time during the study itself.
- I understand that I also have the right to change my mind about participating in the study and can contact the researcher to have my data withdrawn from the study (within 3 weeks of participating)

Signed: _____

Print name: _____

Date: _____

Testing Pack

Participant Code:

Board:

Rate your performance from 1 (worst performance of my life) to 10 (best performance of my life).

1 2 3 4 5 6 7 8 9 10

Rate your confidence in your current diving ability in relation to the following

statements.

Use any number from 1 (not at all confident) to 100 (extremely confident).

My confidence in my ability to:

Keep my concentration	
Control my fear	
Prepare my body for hard dives	
Dive well	
Avoid making mistakes	
Prepare my mind for hard dives	
Achieve what I set out to do	
Use correct diving technique	

Section 2

Please indicate how much you agree with the following statements based on your current diving ability.

Use any number between 1 (strongly disagree) to 100 (strongly agree).

I have positive experiences from past diving sessions.	
I have improved my diving skills by watching professional divers I admire perform well.	
My teammates think I am a good diver.	
I do not worry about mistakes when diving	
I have had positive experiences performing simple dives.	
I have improved my diving skills by watching divers at my level perform well.	
Members of my family believe I dive well.	
I have had positive experiences performing complicated dives.	
Observing my teammates helps me learn new dives.	
My coach has complimented me on my ability to dive	
Diving makes me feel upset.	
I have overcome diving challenges through hard work and practice.	

I have compared my diving skills with those of other divers at my level.	
People have told me that my practice efforts have improved my diving.	
I have watched other divers try a new dive and then decide if I could try the same dive.	
I have received positive feedback about my dives from divers outside of my club.	
I often feel like I can't move when preparing to dive.	
I have met or exceeded other people's expectations for a diver of my age.	

This appendix details the audit trail for study six, which aimed to use an arousal re-appraisal intervention to improve performance and reduce anxiety in competitive divers. The contents of this audit trail are detailed below:

1. Recruitment Email
2. Follow up Recruitment Email
3. Participant Information Pack
4. Child Participant Information Sheet
5. Demographic Form
6. Training Diary
7. Arousal Re-appraisal Workshop
8. Pre Intervention Questions – Diver
9. Pre Intervention Questions – Coach
10. Pre Intervention Questions – Parent
11. Post Intervention Questions – Diver
12. Post Intervention Questions – Coach
13. Post Intervention Questions – Parent

Recruitment Email

Hello All,

First I would like to say thank you for your continued support for my research into diving performance and self-efficacy. Following your involvement I have successfully developed a diagnostic measure for self-efficacy in divers.

I am now developing diving specific psychological interventions to hopefully improve diving self-efficacy and overall diving performance. As part of this research I am looking to recruit diving clubs interested in becoming involved in the following study.

Can physiological psychology interventions improve self-efficacy and performance in divers

For this study I hope to recruit a group of divers at age group or junior elite level. This study is not based around a competition and is an intervention study based around their current training. This study will be based at their training centre and will not require any travelling, researchers will attend training sessions to administer the tests. All timings to be negotiated with coaching staff.

- Divers will be placed in groups based on different interventions and asked to complete a 6 week psychological programme. With baseline and subsequent testing at 2 weeks, 4 weeks, 6 weeks and 8 weeks.
- Coaches will be asked to provide feedback on their divers training performance and psychological wellbeing at the same intervals
- Parents will be asked to provide feedback on their child's training performance and psychological wellbeing at the same intervals
- Baseline tests of performance will be taken and then repeated after the intervention is complete, divers will be asked to perform a series of dives (appropriate to their level) and judged by a national level judge. They will not be made aware of the scores they are given.

Estimated Start Date: 1st August 2016

If you and your diving club are interested in becoming involved in this research or would like further information please contact me on the details below.

Kindest Regards

Emily Pattinson

Sport Psychology Researcher
University of Winchester
07833150601
Emily.Pattinson@winchester.ac.uk
@EmilyPatPsyc

Follow up Recruitment Email

Hello All,

I would like to invite your diving club to get involved with a study being undertaken by the University of Winchester. This study is linked with the previous studies your club has been involved in.

We are investigating the effect of arousal re-appraisal (challenging negative thoughts and feelings) on performance enhancement and anxiety reduction in competitive divers. This research project begins in February 2017.

Your divers will be invited to complete a baseline-testing questionnaire online to establish their levels of anxiety and self-efficacy (self belief). Following this a 15-minute workshop will be delivered to the divers by a researcher at your facility, teaching them skills to challenge their nerves and negative thoughts. They will then be asked to keep a training diary for 5 sessions and finally complete the online questionnaire again after the last of the 5 sessions.

This workshop will be offered **free of charge** to your club, and will be organised at a time to suit your training programme. The workshop is designed for 10 to 15 divers. However

we can deliver to smaller groups for smaller clubs and organise several workshops for bigger clubs.

If you feel this would be of interest to your divers or would simply like more information please get in touch and I will be happy to help.

Participant Information Pack

Study Title: Effects of an Arousal Re-appraisal Intervention on Self-efficacy and Performance in Divers

What is the purpose of the study?

The study is part of a PhD thesis in the Department of Sport and Exercise Science, University of Winchester. The purpose of this study is to investigate the links between self-efficacy and competitive performance in divers. Self-efficacy refers to a person's perception about their ability to perform a task; the study will focus on these perceptions rather than actual ability.

Why have I been approached?

You have been contacted because you are a diver/parent of a diver aged 8 - 18 years, who is currently at competitive standard.

Do I have to take part?

All participation is voluntary, and any you have the right to withdraw yourself/your child at any time during and if you change your mind your data can be removed from the study for up to 3 weeks after participation. To withdraw during the study simply express to the researcher you would no longer like to be involved or email the researcher and they will remove your data.

What will happen to me if I take part?

Divers will complete a short questionnaire, which records their self-efficacy levels, perceived anxiety levels and perceive performance rating. Divers will then be invited to a 15-minute classroom workshop to learn about arousal re-appraisal (how to challenge

negative thoughts and feelings and turn them into positives). Divers will then return to normal training but be asked to fill in a training diary sheet for the 5 sessions following the workshop. 1 week after their final training diary sheet is completed they will complete the same questionnaire as previously. Then their involvement is completed.

What are the possible disadvantages and risks of taking part?

Divers may become more aware of their self-efficacy beliefs, which could have an effect on their behaviour. Support will be offered to divers and coaching staff to discuss any issues that may arise from the study.

What are the possible benefits of taking part?

This research hopes to develop a self-efficacy intervention to assist divers in their performance and provide them with skills to deal with negative emotions and physiological responses (eg. nerves) that will be useful in their diving as well as their wider life.

Will my taking part in this study be kept confidential?

All information obtained will be anonymised, and all of your responses will be kept in a secure password protected electronic files and printed material will be kept in a locked cabinet within the Sport and Exercise Department at the University of Winchester. The data collected will not include any information that can identify participants. We will be collecting details of your age and gender but no names or addresses will be collected. All anonymised data will be accessible via password protection known only to the researchers. It may be that appropriate members of the University of Winchester may be given access to this anonymised data for monitoring or audit of this study to ensure that we are complying with University standards and regulations.

What will happen to the results of the research study?

The results will be analysed and presented as part of a PhD thesis submitted to the University of Winchester. Results may also be used as part of peer reviewed journal articles and conference presentations. No participant will be identifiable in the thesis but if you change your mind about your data being included in the study, as long as you contact us within three weeks of testing taking place, the data can be removed entirely.

Who is organising and funding the research?

The research is organised by Emily Pattinson who is doctoral student at the University of Winchester, Department of Sport and Exercise Science. This project is supervised by Dr Stewart Cotterill and is not externally funded.

Who has reviewed the study?

The University of Winchester Research Ethics Committee has reviewed and approved the study.

Contact for further information

Emily Pattinson

Primary Researcher

Emily.Pattinson@winchester.ac.uk

07833150601

Dr Stewart Cotterill

Research Supervisor

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+44 (0)1962 827296

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Parental Consent Form

Study title: Effects of an Arousal Re-appraisal Intervention on Self-efficacy and Performance in Divers

Participant code: _____

- I am over the age of 18 years and/or the legal parent/guardian of the participant
- I have read and understood the attached study information and, by signing below, I consent to participate in this study.

- I understand that I have the right to withdraw from the study without giving a reason at any time during the study itself.
- I understand that I also have the right to change my mind about participating in the study and can contact the researcher to have my data withdrawn from the study (within 3 weeks of participating)

Signed: _____

Print name: _____

Date: _____

.....

Child Participant Assent Form

Study title: Effects of an Arousal Re-appraisal Intervention on Self-efficacy and Performance in Divers

Participant code: _____

- I am a diver between the ages of 8 and 18 years old
- I have read and understood the attached study information and, by signing below, I consent to participate in this study.
- I understand that I have the right to withdraw from the study without giving a reason at any time during the study itself.
- I understand that I also have the right to change my mind about participating in the study and can contact the researcher to have my data withdrawn from the study (within 3 weeks of participating)

Signed: _____

Print name: _____

Date: _____

Child Participant Information Sheet

Effects of an Arousal Re-appraisal Intervention on Self efficacy and Performance in Divers

Information Sheet

(Participant)

Thank you for showing an interest in this study. Please read everything below before deciding if you want to take part. This information sheet will tell you a little more about the study and what we would like you to do. If you decide not to take part it will not affect your relationship with the research team or your club.

What is this project about?

This study is to find out whether challenging negative thoughts and feelings will improve diving performance.

Who can take part in the study?

If you are 8 – 18 years old and a competitive diver you could take part in this study.

What will I have to do?

If you decide that you want to take part in this study, you will firstly be asked to complete a simple questionnaire online. The questions will be based on how you feel at diving and what effects the way you dive. When you have completed the questionnaire you will be invited along with your team mates to a session held at your pool to learn some new skills to challenge any negative thoughts or emotions diving may cause you. The session will take roughly 15 minutes and take place in a classroom/conference room at your pool within your normal training times. After this session you will be asked to keep a simple training diary for 5 sessions, which will involve answering a few questions and rating your performance in a booklet after each session. Once you have finished the 5 sessions you will be asked to complete the same simple questionnaire online. Then your involvement in the study has finished.

When will I do it?

You will take part within normal training times, on a day that suits yourself, your club and your coaching staff.

Can I stop taking part if I want to?

You can stop taking part in the project at any time, if you want to.

What will you do with the information?

All of the information that the researchers collect will be kept on a computer and the researchers involved in the study will be able to access this. We may use the information that we collect in publications or for presentations, but no one will be able to tell which results are yours, or even who you are, as we never use anyone's real name.

What if I have any questions?

If you have any questions, please just ask any member of the research team at any time.

What do I do next?

If you have read and understood everything that we will ask you to do and you would like to take part, please fill in the assent form in your pack and return to the research team.

Also, please ask your parent/ guardian to sign the consent form that is attached to their information sheet.

Many thanks,

Emily Pattinson

Email: emily.pattinson@winchester.ac.uk

Demographic Form

First name and Surname Initial (e.g John S):

Age (in years):

Gender: Male Female

Competitive Level:

Novice Skills Age Group Junior Elite

Senior Masters

Rate your performance at the moment in training on a scale of 1 (I'm at the worst I've ever been) to 10 (I'm performing better than I ever have done)

Rate your anxiety/fear level at the moment in training on a scale of 1 (I'm scared of everything) to 10 (nothing scares me)

Training Diary

Training Session Diary

Session Number: _____

1. Average anxiety/fear level across the whole session

1	2	3	4	5	6	7
None at all						Extremely High

2. Highest level of anxiety/fear in the session

1	2	3	4	5	6	7
None at all						Extremely High

3. Describe the dive/situation that caused the highest level of anxiety/fear

4. What thoughts came into your mind?

5. Did you try to change your thoughts? YES/NO

6. How much effort did you put into to changing your thoughts?

1	2	3	4	5	6	7
None at all						Extremely High

7. What did you change your thoughts to?

Arousal Re-appraisal Workshop

Duration - 15 minutes

Slide 1: Introduction to 'Challenging the Negatives'

"I can get over the pressure and I can do it" Jack Laugher

Jack Laugher said these words in a post Rio interview, and they are a good example of 'challenging the negatives'

What you think and feel is not always the truth. One way to stop that little voice in your head from controlling your diving progression is to learn to challenge it.

Slide 2: Exercise 1

Sally is trying to learn a back fall for the first time, she is very nervous. As she walks out onto the 3m board a little voice in her head says 'it's all going to go wrong'

How can she challenge this negative?

Sally could say 'All my lead ups went well, so there is no reason to believe anything will go wrong' or 'my coach believes I am ready so I am ready'

Now you think of a negative thought you have had during training, how would you challenge it?

Slide 3: Exercise 2

Ian is about to attempt back 1 ½ for the first time, as he is stood on the board his legs start to shake. He immediately thinks this means he is nervous and is going to fail.

How can he challenge this negative?

Ian could realise that just because his legs are shaking or his heart rate is fast doesn't mean he is nervous. It means his body is getting ready, his muscles are shaking because they are so full of energy and his heart rate is fast to get oxygen to his muscles quicker.

Now you think of an example of how your body reacts when you are diving and how this can be a positive

Slide 4: Any Questions

Pre Intervention Questions – Diver

Please answer the questions below in as much detail as you can. Your answers will assist not only with research but also the development of psychological skills training to assist in divers performance and wellbeing. Answer honestly your responses will be confidential.

1. Describe your feelings towards learning new dives or performing complex dives before the intervention

Pre Intervention Questions – Coach

Please answer the questions below in as much detail as you can. Your answers will assist not only with research but also the development of psychological skills training to assist in divers performance and wellbeing. Answer honestly your responses will be confidential.

1. Describe your diver's behaviour towards learning new dives or performing complex dives before the intervention

Pre Intervention Questions – Parent

Please answer the questions below in as much detail as you can. Your answers will assist not only with research but also the development of psychological skills training to assist

in divers performance and wellbeing. Answer honestly your responses will be confidential.

1. Describe your child's behaviour towards learning new dives or performing complex dives before the intervention

Post Intervention Questions – Diver

Please answer the questions below in as much detail as you can. Your answers will assist not only with research but also the development of psychological skills training to assist in divers performance and wellbeing. Answer honestly your responses will be confidential.

1. Describe how you feel towards learning new dives or performing complex dives after completing the intervention
2. Do you think the intervention worked for you? And why?
3. How do you think the intervention could have been improved?

Post Intervention Questions – Coach

Please answer the questions below in as much detail as you can. Your answers will assist not only with research but also the development of psychological skills training to assist in divers performance and wellbeing. Answer honestly your responses will be confidential.

1. Describe how your diver's behaviour towards learning new dives or performing complex dives after completing the intervention
2. Do you think the intervention worked for your diver? And why
3. How do you think the intervention could have been improved?

Post Intervention Questions – Parent

Please answer the questions below in as much detail as you can. Your answers will assist not only with research but also the development of psychological skills training to assist

in divers performance and wellbeing. Answer honestly your responses will be confidential.

1. Describe how your child's behaviour towards learning new dives or performing complex dives after completing the intervention
2. Do you think the intervention worked for your child? And why?
3. How do you think the intervention could have been improved?

This appendix details the case study database for study six which is a collection of single case research studies to test the effect of an arousal re-appraisal intervention on self-efficacy and performance in divers. This appendix detailed the case study database of the case study into Amy. The contents of this case study database are detailed below:

1. Participant Profile
2. Pre Intervention Comments – Diver
3. Pre Intervention Comments – Coach
4. Pre Intervention Comments – Parent
5. Pre Intervention Session Observation
6. Intervention Diary
7. Post Intervention Comments – Diver
8. Post Intervention Comments - Coach
9. Post Intervention Comments - Parent
10. Post Intervention Session Observation
11. Quantitative Data Set

Participant Profile

Amy is a 15-year-old female diver who has been diving competitively for six years. She has competed at national championships in both skills and age group levels, and she currently competes at age group standard in the 14 to 16 years category. Amy has a previous gymnastic background and maintained her gymnastics for several years after beginning her diving. Amy left gymnastics following her move up to age group diving level in 2014. Amy currently holds county level titles in both the 1 metre and 3 metre events, but currently does not compete on platform.

Pre Intervention Comments - Diver

Amy was asked to answer the following question: Describe your feelings towards learning new dives or performing complex dives.

"I always try to find a way to get out of doing the new dive I aim to achieve by spending a long time working up to it with lead ups or just avoiding the dive completely because it is out of my comfort zone. I think of things that will go wrong as I want to do it perfect first time or I just don't want to try a new dive at all."

Pre Intervention Comments - Coach

Amy's Coach was asked to answer the following question: Describe Amy's behaviour towards learning new dives or performing complex dives.

"Amy will not attempt to perform a new dive unless someone else in the team has already tried and been successful. Amy has a very good sense of her spatial awareness and knows where she is in the air at all times. However she stops herself from performing more complex and difficult dives because she believes she will not be successful in the outcome. It has got to the point of having to ask her to withdraw from competitions before she will attempt the new dives we are adding to her skill list. She loves competitions and she will attempt skills in order to get to a competition, often without leaving enough time to improve the dive ready to compete."

Pre Intervention Comments - Parent

Amy's parent was asked to answer the following question: Describe Amy's behaviour towards learning new dives or performing complex dives.

“Amy sometimes has fear of hurting herself, however she has a zest to succeed even though she can be apprehensive. We have noticed that at times she will avoid new challenges with complex dives.”

Pre Intervention Session Observation

A researcher attended Amy’s diving club and observed her behaviour in a session before the delivery of the intervention. Amy was observed on a Monday evening session in March 2017, the session was 1 hour long.

Amy entered the session on time and talked with a group of divers of mixed ability and age. Amy appears to be very socially confident and a well respected member of the club. Amy began her warm up on poolside with the rest of the divers and continued to chat with her team mates, to the point that she delayed the completion of her warm up taking up time in her session. Amy began on the one metre board and progressed quickly through her existing simple (basic) dives, performing two or three attempts before being encouraged to move on to the next skill. Following the completion of her basic skills, Amy began performing lead ups to a more complex skill. Back 1 ½ from the three-metre board. As part of this preparation Amy progressed up the three-metre board to perform some of her basic skills. Following the completion of her basic skills on the three-metre board, Amy’s effort levels appeared to diminish.

Amy began to perform very differently when asked to work towards more complex skills. Performing her lead up skills at a very poor standard, much poorer than she appears capable of. The performance of the skills at a sub-par standard meant her coach was not comfortable with her attempting the more complex skill. Amy remained performing the lead up skills for 30 minutes of her session before being allowed to have free (play) time. Amy remained in the water away from the diving boards chatting with friends before being asked to exit the water by coaches to allow the next session to begin. She then left with friends to get changed.

Intervention Diary

Amy was asked to record her adherence to the intervention via a diary to be completed after each training session. She was asked to answer seven questions, three of which

were qualitative in nature. The answers to the three qualitative questions are detailed below for each of the five intervention sessions.

Session 1

Describe the dive/situation that caused the highest level of anxiety/fear

“I was performing forward one and a half summersaults with one twist. I can perform and carry out the dive but I do get a bit nervous when getting to the end of the board to take off as I fear I may lose my way in the air when twisting.”

What thoughts came into your mind?

“I went through the dive in my mind correctly, but thought of myself doing it wrong afterwards. I try to forget what may go wrong and perform the dive as I have been taught how to.”

What did you change your thoughts to?

“I can do it and I won't lose my way in the twist, I've done it before.”

Session 2

Describe the dive/situation that caused the highest level of anxiety/fear

“Back one and one half on three metre springboard. I am quite nervous to try this new dive on three metre as I am very worried that I won't spin fast enough”

What thoughts came into your mind?

“That I won't get my arms up behind my head and not make the dive and I might throw too much and over rotate. I can't do it because I will hurt myself.”

What did you change your thoughts to?

“There isn't anything to say that I can't do it, so I should just try and see what happens.”

Session 3

Describe the dive/situation that caused the highest level of anxiety/fear

“I was asked to try back dive tuck from five metre platform. I am not very comfortable when on platform especially not this direction”

What thoughts came into your mind?

"I'm going to land on my face. I won't do it properly"

What did you change your thoughts to?

"If I try it, it won't be as bad as I thought and I will prove to myself that I can do it"

Session 4

Describe the dive/situation that caused the highest level of anxiety/fear

"I was working on my forward one and one half with one twist on the one metre springboard. The entry of the dive make me a bit anxious as I am not too good at it."

What thoughts came into your mind?

"I might hurt myself and I don't want my face to sting. I sometimes see myself doing the dive wrong. I forget about that and concentrate on the dive and how it's supposed to be done"

What did you change your thoughts to?

"I've done this plenty of times before, it may not have been very good but I can do it and will get better the more I practise"

Session 5

Describe the dive/situation that caused the highest level of anxiety/fear

"Forward one and one half with one twist on three metre and back one and one half with half twist on three metre. These are both new dives, I am not very confident diving on three metre so I was quite nervous this lesson."

What thoughts came into your mind?

"I might loose my way in the air when twisting. I might slap the water and hurt myself"

What did you change your thoughts to?

"I can do this and I will do this. I did both new dives and I am really pleased"

Post Intervention Comments – Diver

Amy was asked to answer three questions on completion of the intervention:

Describe your feelings towards learning new dives or performing complex dives.

“I am now a lot more positive when asked to try a new dive and am open to giving them a go, even if it isn’t perfect the first time. I have more of an open mind and idea of what I want to do in my future sessions as I have planned which dives I want to learn for upcoming competitions. The reason for me being keen to try to learn new dives is that there is no evidence to say that I can’t do the dive. I am still slightly apprehensive, however I don’t over think and focus on the positive”

Do you think the intervention worked for you? And why?

“Yes. I believe that this intervention has worked for me as I have a completely different mindset and am willing to learn new dives, where I wasn’t beforehand. I have now performed three new dives since completing the intervention”

How do you think the intervention could have been improved?

“Ask how I feel at the start of each session and again at the end as I may feel different depending on what the outcome of it was”

Post Intervention Comments - Coach

Amy’s coach was asked to answer three questions on completion of the intervention:

Describe Amy’s behaviour towards learning new dives or performing complex dives.

“Amy’s behaviour has changed dramatically since engaging in the intervention study. Amy is much more assertive with her targets and sets her self short and long term goals, and sticks to them. Her diving has improved significantly, she is now learning new and more complex skills nearly ever session, and her competition lists have become more competitive and closer to those of her peers. Amy comes into sessions a lot more focused and is very involved in the planning of her sessions. Although she is still very focused on competitions as a motivation for learning new skills, she has started to recognise her competition performance will improve with more attention to detail on the more complex skills. Overall I am very happy with the positive effect the intervention has had on Amy’s behaviour and focus in and out of the pool”

Do you think the intervention worked for Amy? And why?

“I feel the intervention has worked very well for Amy. She has learnt to take more control and ownership of her training and to stop doubting her ability. She is much more

open about her concerns about learning new dives, and it more willing to take and believe feedback and encouragement. She has also began to think more positively of herself, recognising her ability and positive performances much more than in the past. I feel teaching Amy to question her negative thoughts has not only improved her diving but also her approach to learning new skills and trying new things outside of the pool. Amy has become much more confident in her ability to be a role model to the younger divers, and now is often seen talking to and encouraging younger divers by teaching them similar skills she has learnt in the study”

How do you think the intervention could have been improved?

“I feel for Amy being able to write in more detail or discuss in person her feelings with a person external to the club may of allowed her to come to certain realisations quicker, but over all the intervention has worked wonderfully for Amy”

Post Intervention Comments - Parent

Amy’s parent was asked to answer three questions on completion of the intervention: Describe Amy’s behaviour towards learning new dives or performing complex dives.

“Amy has shown more positivity toward more complex dives and has improved vastly, however she still occasionally worried about getting hurt should the dive go wrong”

Do you think the intervention worked for Amy? And why?

“Yes, the intervention has most certainly instilled some self belief in Amy’s diving as she has tackled and executed some new, more complex dives well!”

How do you think the intervention could have been improved?

“The intervention seems to have achieved well, so at this point we can’t really say other than so far so good”

Post Intervention Session Observation

A researcher attended Amy’s diving club and observed her behaviour in a session following the completion of the intervention. Amy was observed on a Monday evening session in May 2017, the session was 1 hour long.

Amy entered the session a little early and sat on poolside talking to several members of her squad. When the club gave the signal for Amy's squad to begin warming up, Amy was promptly in the pool warming up with other members of her squad. Following the completion of her warm up, Amy spoke with her coach about improving one of her newly acquired dives, back one and one half summersaults with half twist, and informed the coach she wished to work on the dive and perform the dive on the one metre and three metre boards. She also requested that she only be allowed 30 minutes to achieve this goal as she did not want to allow herself to procrastinate.

Amy began diving on the one metre board performing several lead up skills for her complex dive, followed by performing the new skill three times. After prompting from the coach Amy went up to the three-metre board and performed the new skill from the three-metre board. Amy achieved her goals in 26 minutes of the session.

After the completion of her goal, Amy returned to talk to the coach about what she should do with the remaining time in the session. The coach requested Amy work up to a new skill of forward two and one half summersaults. Amy appeared slightly surprised by the request but quickly returned to the one metre board and began working on the lead up skills. With limited encouragement from the coach Amy performed the forward double summersault several times. Following further encouragement from both coach and team mates, Amy performed the forward two and one summersaults on the one metre board. She mentioned she would rather perform it off the lower board first despite the skill being harder as her confidence less on the higher boards, but made plans with coaching staff on when and how she would progress the dive to the higher boards in the coming weeks.

Amy appeared confident and focused throughout the session. She remained social with her teammates, but did not allow social interaction to distract her from her diving. She was encouraging to other members of the team who were also attempting new skills, including another girl attempting the same skill as Amy. Amy left the session in an upbeat mood and was complemented on her bravery by teammates and her parents.

Quantitative Data Set

	Pre-Intervention	Post-Intervention	% Change
Performance	7	7	0
Anxiety	4	4	0
Self-Efficacy	71.88	76.88	6.96
Mastery Experience	77.5	85	9.68
Vicarious Experience	88	81	-7.95
Social Persuasion	68.3	71.66	4.92
Physiological and Emotional States	75.33	86	17.28

	Whole Session Anxiety	Highest Level Anxiety	Adherence to Intervention
Session 1	2	3	5
Session 2	4	6	3
Session 3	4	5	3
Session 4	2	3	7
Session 5	5	6	7
Average	3.4	4.6	5
Percentage	49%	66%	71%

This appendix details the case study database for study six which is a collection of single case research studies to test the effect of an arousal re-appraisal intervention on self-efficacy and performance in divers. This appendix detailed the case study database of the case study into Michelle. The contents of this case study database are detailed below:

1. Participant Profile
2. Pre Intervention Comments – Diver
3. Pre Intervention Comments – Coach
4. Pre Intervention Comments – Parent
5. Pre Intervention Session Observation
6. Intervention Diary
7. Post Intervention Comments – Diver
8. Post Intervention Comments - Coach
9. Post Intervention Comments - Parent
10. Post Intervention Session Observation
11. Quantitative Data Set

Participant Profile

Michelle is a 13-year-old female diver who has been diving competitively for three years. She has competed at national championships in both skills and age group levels, and she currently competes at age group standard in the 14 to 16 years category.

Michelle had no gymnastics or trampoline background before coming to diving. Michelle has county level medals for the one metre and three metre boards, and has recently begun diving platform events. Michelle has known anxiety problems in and out of the diving environment.

Pre Intervention Comments – Diver

Michelle was asked to answer the following question: Describe your feelings towards learning new dives or performing complex dives.

“A bit nervous, not sure why. However if I splat it would be funny and only hurt for five minutes so I can get over it”

Pre Intervention Comments – Coach

Michelle’s Coach was asked to answer the following question: Describe Michelle’s behaviour towards learning new dives or performing complex dives.

“Michelle has some of the best movement skills in the diving team, she is strong, powerful and graceful all in one package. She struggles with her spatial awareness but compensates with her courage. Michelle however cannot see any of this. She has little belief in her abilities and believes she is holding back the group with whom she dives. Michelle will attempt dives before any of the rest of her group, because she sees it as risk taking and dangerous. She does not accept praise well from the coaching staff or her fellow divers. She does however give praise and encouragement to her fellow dive team members.”

Pre Intervention Comments – Parent

Michelle’s parent was asked to answer the following question: Describe Michelle’s behaviour towards learning new dives or performing complex dives.

“Michelle has always thrived on learning new dives but often gets really worked up prior to undertaking the dive. It is obvious that her anxiety gets the better of her and you can visibly see the battle of mind over matter by her body language i.e. shaking and fidgeting on the board prior to take off.”

Pre Intervention Session Observation

A researcher attended Michelle’s diving club and observed her behaviour in a session before the delivery of the intervention. Michelle was observed on a Tuesday evening session in March 2017, the session was 45 minutes long.

Michelle arrived at the pool over an hour before her session began and sat quietly and alone away from other divers. At the start of her session she entered the pool and warmed up on her own away from other divers. Michelle began on the three-metre board, again isolating herself from other divers in her session. She performed simple skills on the three-metre board, receiving feedback from coaching staff but appearing to make little effort to act on suggested changes. Michelle then moved to the one metre board where she was asked to perform skills she is not comfortable with. Michelle’s reaction was very negative, refusing to perform certain skills followed by the performance of different skills than requested. The standard of the skills performed was good, however Michelle’s reluctance to take feedback was apparent. When moving on to more complex dives Michelle’s mood improved. Michelle appeared more willing to perform the more complex skills as the expectation of the performance quality lowers with the complex nature of the skills. Michelle performed several more complex skills on the one metre board to a successful level, but maintained the reluctance to accept positive comments from coaching staff. Towards the end of the session coaching staff requested Michelle perform a skill she did not appear comfortable with, Michelle refused quickly and on protest from coaching staff, Michelle walked away into the shower area. Michelle returned 10 minutes later and completed her diving session without incident, but did not perform the skills she had previously refused. On completion of the session Michelle left quickly and quietly to get changed.

Intervention Diary

Michelle was asked to record her adherence to the intervention via a diary to be completed after each training session. She was asked to answer seven questions, three of which were qualitative in nature. The answers to the three qualitative questions are detailed below for each of the five intervention sessions.

Session 1

Describe the dive/situation that caused the highest level of anxiety/fear

“Reverse one and one half from three metre”

What thoughts came into your mind?

“Don’t really want to do it. Can’t do it. You’re rubbish. I should quit. If I don’t do it I’m going to hate myself”

What did you change your thoughts to?

“Just do it! You’ll live, then nothing”

Session 2

Describe the dive/situation that caused the highest level of anxiety/fear

“Forward double and because I had to do two and one half that session”

What thoughts came into your mind?

“I’m going to go face first and jar my neck again, and I’m going to look even more stupid in front of my coach and I’m a rubbish diver and I don’t want to compete”

What did you change your thoughts to?

“I can do it and my coach will probably just laugh, and ive don’t it a few times before. It obviously didn’t work”

Session 3

Describe the dive/situation that caused the highest level of anxiety/fear

No comments

What thoughts came into your mind?

No comments

What did you change your thoughts to?

No comments

Session 4

Describe the dive/situation that caused the highest level of anxiety/fear

“Back one and one half off the three metre board”

What thoughts came into your mind?

“I cant do it and 95% chance it’s going to go really wrong”

What did you change your thoughts to?

“I need it for NER’s so going to have to do it and if I splat it’ll be funny and I’ll live. It’s not going to hurt really and I’m not going to die”

Session 5

Describe the dive/situation that caused the highest level of anxiety/fear

“I don’t have a list on either board and couldn’t make one because of stupid injuries.

Worried to compete or be around anyone”

What thoughts came into your mind?

“I can’t compete and I don’t want to and I’m useless and worthless and I don’t deserve to be here.”

What did you change your thoughts to?

“I wasn’t scared I just can’t change the voice in my head. I hate her”

Post Intervention Comments – Diver

Michelle was asked to answer three questions on completion of the intervention:

Describe your feelings towards learning new dives or performing complex dives.

“Same as before”

Do you think the intervention worked for you? And why?

“Not really no, because I’m still the same and I’m hard like that so my mind won’t really be positive”

How do you think the intervention could have been improved?

“Don’t know, sorry. Not much”

Post Intervention Comments – Coach

Michelle’s coach was asked to answer three questions on completion of the intervention:

Describe Michelle’s behaviour towards learning new dives or performing complex dives.

“Michelle’s outlook has improved since being involved in the intervention, she is a lot more open to feedback and had begun accepting praise when she is having a good session. She is still experiencing self-doubt and is very critical of herself. Yet she is more open with coaching staff, peers and her parents about how she is feeling which I think is a step in the right direction.”

Do you think the intervention worked for Michelle? And why?

“I think the intervention has helped Michelle to challenge some of her negative thoughts and feelings. I think she still has a long way to go before she truly sees what everyone else sees, but she has made a start”

How do you think the intervention could have been improved?

“I think Michelle just needs more time and encouragement to fully understand her feelings and emotions”

Post Intervention Comments – Parent

Michelle’s parent was asked to answer three questions on completion of the intervention:

Describe Michelle’s behaviour towards learning new dives or performing complex dives.

“Since the intervention, Michelle has become more confident. She takes less time on the board for take off and her general demeanour is more positive.

Her confidence has definitely increased and although there is still scope for improvement, a more positive child is on the board ready to take on new challenges”

Do you think the intervention worked for Michelle? And why?

“Yes, I agree the intervention has worked as mentioned in the previous question”

How do you think the intervention could have been improved?

“There is always scope for improvement in any walk of life but in this instance I am extremely pleased with the outcome. Over time, if Michelle continues on this path, she will become confident and full of self-belief. For now, small steps make steps and I’m happy she has embarked on this journey.”

Post Intervention Session Observation

A researcher attended Michelle’s diving club and observed her behaviour in a session following the completion of the intervention. Michelle was observed on a Tuesday evening session in May 2017, the session was 45 minutes long.

Michelle arrived for her session 30 minutes early and began chatting with other members of the team who had arrived early. She also volunteered to help coach the younger divers before the start of her session. On entering the pool Michelle warmed up with other members of the team, including several girls in her age group. Michelle began the session on one-metre performing simple skills in warm up. After which she approached her coach requesting to learn a new skill. When the coach suggested learning a backwards twisting movement, which is a movement Michelle had not previously attempted, she responded positively. Whilst maintaining she would not be very good at it, she was willing to try. Michelle followed the instructions of the coaching staff closely and listened to feedback well. She also seemed to listen and respond to the encouragement from her peers. Whilst attempting the new skill Michelle performed several attempts that were not fully successful, although not severe enough to cause injury, Michelle did not seem discouraged by the unsuccessful attempts. She returned to the surface of the water laughing, and commenting on how silly she looked in a humorous way. Michelle also showed support for her teammates learning new skills, specifically those girls with whom she competes against, providing moral and physical support to divers learning new skills. Michelle completed the session without incident and left to get changed with her teammates.

Quantitative Data Set

	Pre-Intervention	Post-Intervention	% Change
Performance	3	3	0
Anxiety	5	2	60
Self-Efficacy	29.38	30	2.13
Mastery Experience	60	55	-8.33
Vicarious Experience	54	46	-14.81
Social Persuasion	37.5	38.3	2.13
Physiological and Emotional States	53.3	33.3	-37.52

	Whole Session Anxiety	Highest Level Anxiety	Adherence to Intervention
Session 1	2	3	2
Session 2	3	6	3
Session 3	1	1	1
Session 4	2	4	4
Session 5	3	5	1
Average	2.2	3.8	2.4
Percentage	31%	54%	31%

This appendix details the case study database for study six which is a collection of single case research studies to test the effect of an arousal re-appraisal intervention on self-efficacy and performance in divers. This appendix detailed the case study database of the case study into Sarah. The contents of this case study database are detailed below:

1. Participant Profile
2. Pre Intervention Comments – Diver
3. Pre Intervention Comments – Coach
4. Pre Intervention Comments – Parent
5. Pre Intervention Session Observation
6. Intervention Diary
7. Post Intervention Comments – Diver
8. Post Intervention Comments - Coach
9. Post Intervention Comments - Parent
10. Post Intervention Session Observation
11. Quantitative Data Set

Participant Profile

Sarah is a 14-year-old female age group diver with six years of competition experience. Sarah had no gymnastic or trampoline background before coming to diving. Sarah was selected for diving through the England Talent identification process in 2011, and narrowly missed out on selection to the England Talent second phase in 2012. Sarah has competed at national standard at both skills and age group levels, holding age group county titles in all three disciplines in 2014 and 2015. Sarah had a break from competition for the 2016/17 season to recover from a leg injury and is currently regaining her dives to begin competing again in the 2017/18 season.

Pre Intervention Comments – Diver

Sarah was asked to answer the following question: Describe your feelings towards learning new dives or performing complex dives.

“I am constantly scared and very hesitant to try anything. I’ve ended up going backwards and struggling to do more complex dives, which I know I could do”

Pre Intervention Comments – Coach

Sarah’s Coach was asked to answer the following question: Describe Sarah’s behaviour towards learning new dives or performing complex dives.

“When she as younger she would take and follow instruction very well, however when she moved up a level to age group (12/13yrs) she started to self-analyse her diving. Her basic movement skills are excellent, but she has difficulty in allowing those skills the freedom when performing more complex dives. This shows in spending far too long on the pre-dive stage on the end of the diving board, by which time she has fatigued the big muscle groups required for a strong effective take off.”

Pre Intervention Comments – Parent

Sarah’s parent was asked to answer the following question: Describe Sarah’s behaviour towards learning new dives or performing complex dives.

“Lacking in confidence, will not attempt any new dives, Scared of not succeeding”

Pre Intervention Session Observation

A researcher attended Sarah's diving club and observed her behaviour in a session before the delivery of the intervention. Sarah was observed on a Monday evening session in March 2017, the session was 1 hour long.

Sarah entered the session on time quietly and conversed with the small group of friends she maintains at diving. She proceeded to enter the pool and begin her warm up, occasionally chatting with 2 other female divers. Following her warm up Sarah proceeded to the 1 metre board (where she remained for the entire session), training mainly with the lower level divers who are not in her ability group. She maintained a quiet, introverted attitude for the session and did not extend much interaction to others past small talk. She stuck with well-established skills she is confident with. Staying with the same skill for between 15 to 20 minutes without changing skill or progressing in performance quality. Sarah performed four different skills in the one-hour session. Making little effort to encourage her coach to allow her to progress or change skill. Sarah appeared to listen and respond well to feedback given, but did not appear to act on suggestions from coaching staff. At the end of the session Sarah, went back to talking with the small group of divers she talked with before the session and left the session to get changed.

Intervention Diary

Sarah was asked to record her adherence to the intervention via a diary to be completed after each training session. She was asked to answer seven questions, three of which were qualitative in nature. The answers to the three qualitative questions are detailed below for each of the five intervention sessions.

Session 1

Describe the dive/situation that caused the highest level of anxiety/fear

"Inward dive with half twist"

What thoughts came into your mind?

"I thought I was going to hit the board or land flat after the twist"

What did you change your thoughts to?

"I thought, it will be fine, I won't hit the board because I always throw myself backwards"

Session 2

Describe the dive/situation that caused the highest level of anxiety/fear

No comments

What thoughts came into your mind?

No comments

What did you change your thoughts to?

No comments

Session 3

Describe the dive/situation that caused the highest level of anxiety/fear

"Forward summersault with two twists"

What thoughts came into your mind?

"I'll splat or I'll not do it"

What did you change your thoughts to?

"It will be fine. If I splat, I splat and at least I'll have something to show for it"

Session 4

Describe the dive/situation that caused the highest level of anxiety/fear

"When I was doing back summersault with half twist and the coach told me to put it on my head"

What thoughts came into your mind?

"I'll smack and not make it round"

What did you change your thoughts to?

"It'll be fine, just go for it. I've got plenty of time to get it round"

Session 5

Describe the dive/situation that caused the highest level of anxiety/fear

“Back summersault with half twist on three metre”

What thoughts came into your mind?

“If I throw it like I do on one metre it will go well over”

What did you change your thoughts to?

“Just do it slower and with less power and it won’t go over”

Post Intervention Comments – Diver

Sarah was asked to answer three questions on completion of the intervention:

Describe your feelings towards learning new dives or performing complex dives.

“Now, I feel scare still, however I am beginning to become less hesitant and am starting to try new dives. I also feel as though my dives are progressing into more difficult dives”

Do you think the intervention worked for you? And why?

“Yes, as I have increased in confidence and am beginning to improve in my mentality/mindset”

How do you think the intervention could have been improved?

“I think there could be discussions about any progress in between the intervention”

Post Intervention Comments – Coach

Sarah’s coach was asked to answer three questions on completion of the intervention:

Describe Sarah’s behaviour towards learning new dives or performing complex dives.

“Sarah has shown a marked improvement in her approach to new or more complex dives. She is more proactive in her training and requesting to attempt new skills, and if a skill is suggested to her she will progress and attempt the skill more often than not. I am happy that Sarah is showing more control of her nerves and is spending less time procrastinating in her training. Despite the fact she still is spending too long in the pre-

dive phase, there has even been an improvement there, she is baulking her take-offs a lot less than before.”

Do you think the intervention worked for Sarah? And why?

“I think the intervention has worked for Sarah, and has made her challenge some long standing anxieties and fears about certain skills. She seems to be a lot closer to the positive attitude she had before her injury and set backs”

How do you think the intervention could have been improved?

“I think Sarah could have benefited from more involvement by the researchers. As the communication between diving and home is not as strong with Sarah’s family, further support to ensure she stuck to the intervention could have been helpful”

Post Intervention Comments – Parent

Sarah’s parent was asked to answer three questions on completion of the intervention:

Describe Sarah’s behaviour towards learning new dives or performing complex dives.

“Building in confidence. Dives she felt she no longer could do she now attempts and succeeds in doing”

Do you think the intervention worked for Sarah? And why?

“Yes, better confidence”

How do you think the intervention could have been improved?

No comments

Post Intervention Session Observation

A researcher attended Sarah’s diving club and observed her behaviour in a session following the completion of the intervention. Sarah was observed on a Monday evening session in May 2017, the session was 1 hour long.

Sarah entered the session ten minutes early greeting her teammates and coach cheerfully. Sarah began her warm up on time and quickly progressed to the one metre board. Sarah began with simple skills. Other members of Sarah’s team were learning a forward double summersault from the one metre board; her coach requested that she work with this group to attempt to regain the skill. She had not performed the skill since her injury. Sarah seemed hesitant but agreed to work with the other girls to perform the skill. After doing all the appropriate lead up skills, the two other girls attempted the skill. Shortly after their success Sarah was asked to perform the skill. Sarah agreed and with some encouragement from her teammates and coaches she successfully performed the skill three times. Sarah seemed very happy with her progress and was congratulated by her teammates and coaching staff. The three girls were awarded free time in which they were allowed to train the skills they wanted. The girls chose to perform simple skills from the three metre board, which Sarah would not normally go on to the higher boards due to her injury, she joined in and performed very competent simple skills from the three metre board. After the session Sarah spoke to her coach about how positive she felt about performing the forward double summersault and then left with her teammates to get changed.

Quantitative Data Set

	Pre-Intervention	Post-Intervention	% Change
Performance	5	5	0
Anxiety	5	4	20
Self-Efficacy	44.13	44.38	0.6
Mastery Experience	50	58.75	17.50
Vicarious Experience	54	66	22.22
Social Persuasion	44.16	33.33	-24.52
Physiological and Emotional States	44.33	56.33	27.07
	Whole Session Anxiety	Highest Level Anxiety	Adherence to Intervention
Session 1	2	3	5
Session 2	1	1	1

Session 3	3	3	5
Session 4	2	3	4
Session 5	4	5	4
Average	2.4	3	3.8
Percentage	34%	43%	54%

Study One and Two



**RESEARCH ETHICS COMMITTEE
DECISION STATEMENT**

<p>Application Number: 255</p> <p>Project Title: Development and Validation of the Diving Self-Efficacy Scale</p> <p>Chief Investigator: Sandra Leyland (PhD Supervisor)</p> <p>Co workers: Emily Pattinson (PhD Student), Dr David Archer (Co-Supervisor)</p> <p>Date: 28-07-2015</p>
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YOUR RESEARCH PROJECT DECISION IS LISTED BELOW

<p>APPROVED WITH NO CONDITIONS: This means you may start the project immediately.</p>	
<p>PRE-CONDITIONS: This means you must complete the conditions listed below before you start the project. However, you DO NOT have to send any information back to the Committee. The Committee will assume completion of these conditions.</p> <ul style="list-style-type: none"> • The Committee felt that the description of the questionnaire part of the project lacks sufficiently detailed information about recruitment and data collection procedures. Therefore, this approval does only cover the focus group part of the project. <ul style="list-style-type: none"> ○ A separate ethics approval application should be submitted when the questionnaire development is completed and data collection/recruitment procedures are thought through. • Consideration should be given to potential impact of the number of participants per focus group and age differences between focus group participants. • Focus Group Participant Information Sheets <ul style="list-style-type: none"> ○ Produce three separate participant information sheets: (1) for parents (who will be asked for parental consent), (2) for participants over the age of 18 and (3) for participants under the age of 18. ○ Participant information for children/young people under the age of 	

<ul style="list-style-type: none"> 18 should be written in age appropriate language. <ul style="list-style-type: none"> o Include statement about disclosure, i.e., to whom will information be disclosed should focus group discussions reveal unethical practice at the Sunderland Aquatics Centre. o Ensure that the material is proof-read. • Focus Group Consent Forms (Parental and participants over the age of 18) <ul style="list-style-type: none"> o Include statement about audio-recording of focus groups. o Include boxes requesting participants to initial each of the statements. • Produce separate assent form for focus group participants under the age of 18. • Check with business assurance team to ensure that data collection off site is covered by liability insurance. • The end date of the project (see application form) should be in line with end date of the PhD programme. 	
<p>COMMITTEE-CONDITIONAL: This means you complete the conditions listed below and that you MUST send the information requested back to the Committee's officer Mrs. Michelle Marshall at ethics.review@sunderland.ac.uk. Once the committee has received this information, it will contact you again about its decision. You must await the Committee's final decision, before you start the project.</p>	
<p>REJECTION: This means the committee does not wish this research to commence. You should not start this research. The Research Ethics Committee will explain why it has reached this view. Please contact the Committee Chair if you have any questions.</p>	
<p>RECOMMENDATIONS: These are simply points of advice from the committee. They are OPTIONAL. You do not have to undertake them or contact the committee about them.</p>	

Signed by the Committee Chair:



Dr Etta Evans

Study Three and Four



**RESEARCH ETHICS COMMITTEE
DECISION STATEMENT**

<p>Application Number: 268</p> <p>Project Title: Validation of the Diving self-Efficacy Scale</p> <p>Chief Investigator: Sandra Leyland</p> <p>Co workers: Emily Pattinson (PhD student), Dr David Archer (Co-Supervisor)</p> <p>Date: 03-12-2015</p>
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YOUR RESEARCH PROJECT DECISION IS LISTED BELOW

<p>APPROVED WITH NO CONDITIONS: This means you may start the project immediately.</p>	
<p>PRE-CONDITIONS: This means you must complete the conditions listed below before you start the project. However, you DO NOT have to send any information back to the Committee. The Committee will assume completion of these conditions.</p> <ul style="list-style-type: none"> ❖ The Parent and Participant Information sheets need thorough editing. Make sure that they are not copies of each other. The following comments provide you with <u>examples</u> of information that is not appropriate for one or the other target group. <u>Parent Information sheet</u>, see for example <ul style="list-style-type: none"> • section headerings need rewording: 'Does my child have to take part?', 'What will happen to my child' 'Will my child's taking part ...' • reference to participants under the age of 18 (Do I have to take part?) is not appropriate • Sentence 'If you are reading this as a parent of a child ...' is redundant <u>Participant Information sheet</u>, see for example • All references to child participants and under 18s ❖ Parent and Participant Information sheets <ul style="list-style-type: none"> • Include details about how to withdraw whilst completing the questionnaires (e.g., closing the web browser) and afterwards (email?) 	

<ul style="list-style-type: none"> ❖ Child Participant Information sheet <ul style="list-style-type: none"> • Withdrawal should involve parents/guardians sending an email rather than the child. ❖ Consider reducing the age of consent to 16+ year-olds instead of 18+. ❖ Copyright of questionnaires <ul style="list-style-type: none"> • The Committee wondered why permission had only been obtained for one of the questionnaires. Consider copyright conditions of all questionnaires and if appropriate, obtain permission from the author(s) before using the questionnaires. 	
<p>COMMITTEE-CONDITIONAL: This means you complete the conditions listed below and that you MUST send the information requested back to the Committee's officer Mrs. Michelle Marshall at ethics.review@sunderland.ac.uk. Once the committee has received this information, it will contact you again about its decision. You must await the Committee's final decision, before you start the project.</p>	
<p>REJECTION: This means the committee does not wish this research to commence. You should not start this research. The Research Ethics Committee will explain why it has reached this view. Please contact the Committee Chair if you have any questions.</p>	
<p>RECOMMENDATIONS: These are simply points of advice from the committee. They are OPTIONAL. You do not have to undertake them or contact the committee about them.</p>	

Signed by the Committee Chair:



Dr Etta Evans

NOTE:

- The Research Ethics Committee must be informed about any changes to the approved study protocol.
- The University of Sunderland 'Research Ethics Completion Statement' proforma must be completed and submitted to the Committee within three months following the project end date.

Study Five and Six



Monday 6th June 2016

Emily Pattinson

Department of Sport and Exercise

University of Winchester,

Sparkford Road,

Winchester, SO22 4NR

Dear Emily Pattinson

Re: Faculty of Business, Law and Sport RKE Ethics Application [BLS/16/03]

Title: Self-Efficacy and Competitive Performance in Springboard and Highboard Divers

Thank you for your submission to the University of Winchester, Faculty of Business Law and Sport (BLS) ethics panel.

On behalf of the Faculty of BLS RKE Ethics Application I am pleased to advise you that the ethics of your application have been approved. Approval is for five years. If the project has not been completed within five years from the date of this letter, re-approval must be requested.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Head of the Faculty BLS ethics committee.

Yours sincerely



Dr James Faulkner

Head of Ethics, Faculty of BLS

University of Winchester

cc [Dr Stewart Cotterill]

Dr James Faulkner, Head of Ethics in the Faculty of BLS
Email: James.Faulkner@winchester.ac.uk; Tel: +44 (0)1962 624932