

Bangor University

DOCTOR OF PHILOSOPHY

Complex interventions in sport psychology : coach behaviour change and psychological skills

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Award date:
2015

Awarding institution:
Bangor University

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Complex interventions in sport psychology: Coach behaviour change and psychological skills

PhD Thesis submitted to Bangor University in fulfilment of
the requirements for the degree of Doctor of Philosophy at the
School of Sport, Health and Exercises, Bangor University.

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Submitted: 28.11.2014

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Acknowledgements

Nicky and Ross, your guidance, knowledge and support throughout this process has been truly invaluable. Your belief in me and your patience enabled me to learn from my mistakes and gain many valuable experiences. Your roles in my life and what you have taught me stretch far beyond the research process, you have helped me to better understand myself and have been role models to me as researchers, leaders and friends.

Many thanks to Sport Wales for supporting this project and seeing a need to support coaches in Wales. Special thanks to Joy, your continuing advice and support made this project happen and made a big difference to me, academically and personally. Fiona, your help throughout my final study was essential, thank you for being totally reliable and generous with your time. Thanks also to all of the coaches and athletes who gave up their time to participate in this research.

There are so many friends and staff from Bangor University, both past and present, who have supported me and made my PhD journey enjoyable and enlightening. Being part of such a great department has given me a precious experience of genuine team work, which I will always remember. In particular, Lauren and James, you inspired me to push the boundaries of my experience and helped me to grow as a researcher, lecturer and applied practitioner. To Caoimhe, Samantha and Peter I am so grateful for your friendship and support, you were always there for me and helped me to persevere through difficult moments. Gwladys and Benni you grew to understand the joys and challenges of doing a PhD alongside me, whilst providing many adventures and good times along the way.

Mum, Bryony, Henry, and all my extended family, I am only at this point thanks to your love. Thank you for inspiring me as you all achieve your dreams and show me how 'the Poynor's dig deep'. Thank you all of your encouragement and always being there at the end of the phone. My best friend Rosie, thank you for setting off on the journey into Psychology with me and for seeming to be by my side all the way through this PhD not matter how far away you were.

Finally and most importantly, to my wonderful Husband to be, Calum. Your faith in me and patience throughout this entire process has amazed me. Your unwavering support was everything I could have asked for and more. You have shown me what true generosity is and I cannot thank you enough. I cannot wait to start the new chapter of our lives together.

Thesis Abstract

This thesis is written as three chapters detailing five studies related to the coaching of psychological skills (PS) and coach behaviour change. There were three main aims to this thesis: (a) to utilise a rigorous approach to the implementation and evaluation of a sport psychology intervention, guided by Medical Research Council guidelines for complex interventions; (b) to extend knowledge regarding the effective facilitation of coach behaviour change; and (c) to establish an effective format of coach intervention to optimise coach provision of PS support for athletes.

Study 1 piloted a need supportive coaching PS intervention informed by Self Determination Theory (Ryan & Deci, 2002). The mixed method intervention evaluation demonstrated positive outcomes in the coach encouragement of PS, some athletes' use of PS and some athletes' training behaviours. Additionally, unintended outcomes were also evident (e.g., changes of coach employment and further dissemination regarding PS). The process evaluation of the pilot study highlighted that the intervention was need supportive. Possible improvements were identified for future interventions in terms of the provision of structure, the measurement of behaviour change and data collection processes. Based on the pilot findings an intervention process model was created to indicate the components of coach change to be addressed in the subsequent intervention; namely, coach understanding of PS, coach need satisfaction, coach self-discrepancies, coach attitudes, coach intentions to coach PS and coach procedural knowledge.

Studies 2-4 involved the development of novel coaching PS measures. Specifically a questionnaire measuring the fundamental components of coaching PS (CPS-F) and a questionnaire measuring the need supportive coaching of PS (CPS-NS) were developed. Following confirmatory factor analysis procedures and item deletion, acceptable model fits

were provided for each measure, supporting a 3-factor structure for the CPS-F and a single factor structure for the CPS-NS questionnaires. Study 4 provided initial support for the concurrent, discriminant and predictive validity of these questionnaires.

Study 5 was a full-scale intervention implementation and evaluation informed by Study 1 and using measures created and validated in Studies 2-4. The study used a mixed-methods between-groups design to compare the efficacy of standardised PS workshops delivered online and a need-supportive coaching PS mentoring intervention. The results revealed that the mentoring intervention had more positive, long-term impact on the coaching of PS and athlete awareness of PS use than the workshop method. However, the coaches who received the online intervention did experience some need support which was an unintended consequence. It was revealed that the relationship between the coaching of PS and athletes' performance is mediated by athlete awareness of PS, athlete use of PS in training and athlete training behaviour (coping and effort). Levels of need support provided on the programme were related to coach need satisfaction, coach beliefs about PS and coach intentions to coach PS highlighting that future interventions should seek to better support coaches' needs.

At the end of thesis a publication plan of how the PhD chapters were to be published has been provided (See Appendix L).

Chapter 1

General Introduction

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General Introduction

This general introduction has been written in order to provide an overview of the current PhD thesis in relation to coach intervention research. It also serves as an introduction to the key themes which occur throughout the thesis namely: a focus on rigorous coach intervention evaluation, the use of behaviour change theory within coach interventions; and the coaching of psychological skills. As the introduction of each subsequent chapter presents an in-depth review of its relevant literature, this general introduction is purposefully short to avoid unnecessary repetition.

Coach education research

The role of the sport coach has been of interest to researchers and practitioners in sport for a number of decades (e.g., Gilbert & Trudel, 2004; Orlick & Botterill, 1975). A plethora of research findings indicate that the coach-athlete relationship is pivotal an athlete's successful participation in sport (e.g., Rottensteiner, Kontinen, & Laakso, 2015) and coaching behaviours influence a wide range of athlete thoughts, feelings and behaviours (e.g., Cumming, Smoll, Smith, & Grossbard, 2007; Smith, Smoll, & Curtis, 1979). Given the influence of coaches over their athletes, coach education programmes have become a priority for national governing bodies and sports organisations (Coaching Association of Canada, Trudel & Gilbert; 2010; UK coaching certificate initiative; Nelson & Cushion, 2006). However, despite extensive coach education provision, past programmes have been criticised due to a lack of evidence that they actually enhance coaching behaviour on the field (Abraham & Collins, 1998; Gilbert & Trudel, 1999; Nash & Sproule, 2012).

Nelson, Cushion and Potrac outlined (2006) that coach development can occur through a wide variety experiences including; formal coach education (e.g., activities and classes towards a qualification; Irwin, Hanton & Kerwin, 2004), non-formal (e.g., coaching clinics and courses; Coatsworth & Conroy, 2006), informal (e.g., athletic and coaching

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experience; Jones, Armour, & Potrac, 2003) and self-directed education (e.g., reading relevant material; Gilbert & Trudel, 2001). Academics have concluded that coaches spend very little time in formal and non-formal education and the provision of education is limited, particularly in comparison to other pedagogical professions such as teachers (Gilbert & Trudel, 2009). Formal coach education programmes have tended to focus on delivering technical and tactical knowledge and topics in sports science (Nelson et al., 2006). However, reviews of these formal programmes suggest that they contain too much content and fail to provide opportunities for coaches to gain practical competencies (Cushion, Armour, & Jones, 2003). Indeed, the coaching literature has begun to recognise that an information based ‘top down’ approach from coach educators does not facilitate change (cf. Côté, 2006; Cushion et al., 2003) and that the majority of coaching expertise is formed via informal, context-specific, experiential learning and reflective practice (Côté, 2006; Werther & Trudel, 2006). More recently, researchers have suggested that formal coach education programmes would be more likely to facilitate change if they were designed to provide more contextually relevant forms of learning (e.g., North, 2010, Lyle, 2010). However, the specific coach development practices which optimise outcomes in different contexts are largely unknown due to the lack of longitudinal investigation into coaches’ learning and the lack of empirically-tested coach interventions (Langan, Blake, & Lonsdale, 2013; Trudel, Gilbert, & Werthner, 2010). This PhD aimed to assist the improvement of coach education, via promoting more rigorous intervention research and initiating a more in-depth understanding of coach learning and coach behaviour change.

A review of the coach learning and development literature concluded that there is a relative absence of empirically informed research into coach learning (Cushion et al., 2010). There has been retrospective study into the development of coaching expertise (Erickson, Côté, & Fraser-Thomas, 2007; Gilbert, Côté, & Mallett, 2006), where coaches suggested that

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formal coach education had little impact on their development and that they learned through experience as an athlete, then as a coach, and via coach mentors whilst being a novice coach. Whilst informative, this retrospective research fails to provide true insight into the mechanisms of coach change and how to optimise it via coach education, which can solely be gained via longitudinal and intervention research. However, the extant coach intervention research suffers from many problems. These include a lack of experimental designs (with a sole focus on post-test outcomes, e.g., Cassidy, Potrac & McKenzie, 2006), variability in the validity of measurement tools (e.g., Harwood, 2008) and a failure to measure changes in athlete outcomes (e.g., Maleté & Feltz, 2000). Indeed, due to the lack of rigour within coach intervention research, it is often unclear what specific changes in coaches and athletes are created by the intervention.

However, there has been some empirically sound longitudinal research into effective means of non-formal coach education. Indeed, Smith and Smoll have conducted arguably the most significant body of longitudinal research into the impact of coach training interventions on athlete outcomes. The training interventions were known as the Coach Effectiveness Training (CET) (Barnett, Smoll, & Smith, 1992; Coatsworth & Conroy, 2006; Conroy & Coatsworth, 2004; Smith, Smoll, & Curtis, 1979; 1995, Smoll, Smith, Barnett, & Everett, 1993) and later the Mastery Approach to Coaching (MAC) (Smith, Smoll, & Cumming, 2007). These interventions were informed by Smith and Smoll's findings (Smith & Smoll, 1990; Smith, Smoll & Curtis, 1978; Smith, Zane, Smoll et al., 1983) that coach behaviour strongly influenced athletes (aged between 8-15 years old) attitudes towards their coach, as well as their self-perceptions and sport experience. The CET programme aimed to assist coaches to promote a mastery approach to sport, by using positive social influence techniques rather than aversive control, conceptualising winning as giving maximum effort and nurturing the self-awareness of the coaches in relation to eight key behaviours (see Smoll & Smith,

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1987). CET involved a workshop approach (2.5 hours) to coach training combined with; personal coach profiling based on observations of their coaching behaviour; a manual of behavioural guidelines; self-monitoring forms completed by the coaches after games and reminder telephone calls. The effectiveness of the CET program was tested in two quasi-experimental studies which compared CET trained coaches and their athletes with those in control groups (Barnett, Smoll, & Smith, 1992; Smith et al., 1979; Smith et al., 1995; Smoll et al., 1993). The results indicated the effectiveness of the CET; which impacted coach behaviour change (e.g., increased reinforcement and encouragement and reduced punitive remarks) and a variety of athlete outcomes (increased self-esteem and reduced anxiety, fear of failure and drop-out). Smith and Smoll's more recent programme MAC (75 minutes discussion based programme mirroring the principles of CET) found similar coach and athlete outcomes in comparison to control groups (Smith et al., 2007; Smoll et al., 2007). As such Smith and Smoll's research offers an insight into the potential benefits of training coaches' in mastery and positive coaching principles, however this intervention research is not without weaknesses. As with most coach intervention research, Smith and Smoll's research failed to capture any long-term effects of the training. Also crucially, Smith and Smoll and their colleagues did not investigate *how* the intervention outcomes were obtained meaning that the facilitative aspects of intervention delivery and/or the barriers preventing coach change remain unknown.

Indeed, most coach interventions are conducted without a coherent theoretical basis (Langan et al., 2013). Within coach intervention delivery, authors tend to design interventions delivery based on traditional didactic techniques rather than describing or testing specific theoretically-informed coach behaviour change techniques (e.g., Harwood, 2008; Maleté & Feltz, 2000). A lack of theory informed delivery as well omissions in evaluating delivery processes hinders progress towards understanding and improving coach education and limits

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replication of even the most successful coach interventions (e.g., Coatsworth & Conroy, 2006; Smoll et al., 1993). For example, despite presenting a research-based rationale for intervention delivery, the behaviour change techniques implemented within the CET and MAC were not fully described or evaluated (Barnett et al., 1992; Smith et al., 1979; 1995, Smith et al., 2007; Smoll et al., 1993; Coatsworth & Conroy, 2006; Conroy & Coatsworth, 2004). Indeed, when the replication of a CET intervention was attempted by researchers other than Smith and Smoll (Coatsworth & Conroy, 2006; Conroy & Coatsworth, 2004), the intervention made little impact on coaches or athletes. Seemingly, the active ingredients contributing to Smith and Smoll's results were not successfully replicated by Conroy and Coatsworth, as they were largely unknown. It could be suggested that if the theoretical basis for Smith and Smoll's *intervention delivery* had been explicit and process of implementation had been evaluated, Coatsworth and Conroy may have been better able to mimic effective intervention delivery and foresee the potential barriers in their unique delivery context (Conroy & Coatsworth, 2004).

More recent coach intervention research involving transformational leadership training (Vella, Crowe & Oades, 2013; Vella, Oades & Crowe, 2013) has adopted a more research informed design and in-depth evaluation of intervention delivery. The evaluation of intervention delivery highlighted the importance of information, practical demonstrations and learning via a collaborative relationship between coach learner and educator (Vella et al., 2013). Therefore, a central aim of the PhD was to build on the work of Vella and his colleagues with the use of behaviour change theory within coach intervention research to ensure effective educational relationships and activities to create coach behaviour change.

Psychological skills as topic for coach intervention research

A specific topic in need of theoretically informed investigation is the coach delivery of psychological skill (PS) training. PS training has well-known benefits (e.g., Martin &

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Toogood, 1997; Martin, Vause, & Schartzman, 2005; Tod, Hardy, & Oliver, 2011) however delivering PS training is challenging and rarely conducted by coaches (Callow, Roberts, Langan, & Bringer, 2010; Paquette & Sullivan, 2012). Furthermore, the effectiveness of the limited number of existing coaching PS interventions is equivocal (Callow et al., 2010; Edwards, Law, & Latimer-Cheund, 2012; Hall, Jedlic, Munroe-Chandler, & Hall, 2007; Hall & Rodgers, 1989; Harwood, 2008). The limited success of previous interventions coupled with the potential value of the increased coaching of PS for athletic performance, the coaching of PS offers an ideal area within which to develop rigorous and theoretically driven interventions. Further, the results of more rigorous intervention studies will extend current knowledge regarding the coaching PS and how to facilitate the coaching of PS.

A framework for improving coach intervention research

There are many factors which could contribute to weaknesses in coach intervention research, namely the extensive resources required to run and comprehensively evaluate longitudinal coach interventions and the complexity of the coaching process itself. Cushion and Lyle (2010) suggested that “research approaches have taken an overly simplistic approach to coaching resulting in dearth of useful research into the conceptual development of the coaching process (p.3).” Given the complexity of the subject and potential impact of improving the quality of coach intervention research, guidance is required to assist the research process.

Guidance is available to deal with such complexity within medical and clinical intervention research, known as the Medical Research Council (MRC) for Complex Interventions (Craig et al., 2008). These guidelines offer suggestions to ensure the quality of development, evaluation and replication of complex medical interventions involving medical staff and patients. The guidelines are applicable to coach intervention research as many parallels can be drawn between coaching and medical domains. For example, the number and

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degree of variability of outcomes occurring are vast in both contexts and both contexts target a number of groups or levels in the interventions (e.g., coach interventions could target coaches, athletes, as well as parents). Further, in coaching and medical settings, a degree of contextual flexibility is important for interventions to be beneficial, and the behaviours required by deliverers and participants of interventions may also be difficult to execute.

The MRC guidelines (Craig et al., 2008) suggest that researchers should invest significant resources into intervention development to ensure that the proposed intervention can be expected to make a practical impact. During intervention development the guidelines suggest that; intervention design should be based on the use of behaviour change theory; researchers should pilot interventions to ensure their feasibility and; the process or causal chain via which the intervention will facilitate the desired outcomes should be made explicit or ‘modelled’ (e.g., Hardemann et al., 2005). As a result of such development work, researchers are then better informed to ‘iron out’ issues and select the most valid outcome measures in order to evaluate the intervention. The MRC guidelines also emphasise an intervention’s practical effectiveness by recognising the need to tailor elements of the intervention to suit particular contexts, rather than prioritising a rigidly controlled protocol. When evaluating interventions in order to understand an intervention’s effectiveness in everyday practice, the guidelines advocate the use of a mixed methods approach and highlight the importance of dealing with multiple outcomes, whilst staying alert to unintended outcomes of the intervention. Finally, the MRC guidelines suggest that evaluations of complex interventions should obtain information regarding *why* it is effective (or not) by evaluating the intervention process.

A Theory-Driven Coaching PS Intervention

The intervention work within the thesis utilised Self-Determination Theory (SDT; Ryan & Deci, 2002) as a theoretical basis. SDT is a well-established theory of human

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motivation and behaviour which proposes that individuals have three basic psychological needs. The satisfaction of an individual's needs predicts the nature of an individual's motivation and autonomous engagement in specific activities. Considerable evidence exists supporting the tenets of SDT in a variety of contexts (e.g., Ng et al., 2012; Reeve, Jang, Carrell, Soohyun, & Baach, 2004; Standage, & Vallerand, 2014.). Within previous coaching PS literature (Callow et al., 2010) and other coach development literature (Allen & Shaw, 2009), there is little evidence of coaches' needs being satisfied. Thus it was thought that designing an intervention to be intentionally need supportive could increase the likelihood of coach behaviour change regarding the coaching of PS. Specifically, SDT research suggests that the provision of need support by intervention practitioners corresponds to increases in an individuals need satisfaction and subsequent motivation and behaviour (Markland & Tobin, 2010). More specifically need support is fostered through three mechanisms: autonomy support (the promotion of choice and recognition of coaches perspectives); structure (making expectations and outcomes apparent and providing clear feedback); and interpersonal involvement (a genuine rapport and positive regard provided by the facilitator). Indeed, Vella et al., (2013) suggested that a supportive and collaborative coach learner- coach educator relationship was key to coach change and as such coaches' need satisfaction and self-determination should be encouraged. Therefore the PhD thesis aimed to promote the coaching of PS by the design of a need supportive intervention.

In addition to SDT, additional behaviour change processes were established (within Chapter 2) via an inductive, qualitative pattern analysis (Ragin, 2000). The pattern analysis compared different coaches' experiences on the intervention and the outcomes produced in their context. From the patterns found, additional mechanisms of facilitation alongside need support were identified which were found to mirror suggestions of other models and theories of behaviour change (Ajzen, 1991; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003;

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Higgins, 1987; Michie, Johnston, Francis, Hardemann, & Eccles, 2008; Weinstein, 1998).

Therefore, the thesis research is aligned to the conclusions of Cushion et al. (2010) that a theoretically eclectic approach to coach development has advantages because there are multiple approaches to effective coach education and coach interventions. However, Cushion et al., (2010) also suggested that coach education should be explicit about the theory informing programme design, and how it relates to an understanding of how coaches learn, and aligns to the objectives of a programme.

Aims and Summary of Thesis

There were three main aims to this thesis; (a) to provide an example of a rigorous approach to the implementation and evaluation of a sport psychology intervention, guided by MRC guidelines for Complex interventions, (b) to extend knowledge regarding the effective facilitation of coach behaviour change, and (c) to establish an effective format for coach intervention to optimise coach provision of PS support for athletes. In order to examine these aims Chapter 2 reports the development and piloting of a theoretically informed coaching PS intervention, the results of which provided more theoretical information regarding the key components of coach change in a PS context. Chapter 3 describes the development and validation of two novel coaching PS measures to adequately capture coach behaviour change based on the findings in Chapter Two. Finally, Chapter 4 presents a full-scale intervention and controlled evaluation informed by Chapter 2 and using measures created and validated in Chapter 3. Throughout the thesis a mixed method approach was adopted and intervention processes as well as outcomes (both intended and unintended) were evaluated. Furthermore, a flexible approach to intervention implementation was adopted as coaches were given some control over their intervention experiences to prioritise effectiveness. Moreover, in line with MRC guidelines and calls from the coaching literature (cf. Langan et al., 2013), the intervention design and delivery was underpinned by relevant behaviour change theory.

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Finally, the General Discussion Chapter summarises the research findings of the PhD and then highlights the conceptual points of interest, the applied implications, the strengths and limitations of the thesis and recommendations for future research directions are made.

Implications

The current research has several implications related to the coaching of PS, coach education and coach intervention research. The research established whether the coaching of PS can be effective, what the nature of coaching PS is and created a valid measure of coaching PS behaviour. As such this PhD research will assist researchers to investigate coaching of PS more reliably and in more depth. Also the PhD sought to establish whether the coaching of PS warrants further investment and coach education. The findings are expected to assist practitioners and coach educators to support coaches' needs and facilitate coach behaviour change within coach education in a number of domains. Moreover, it is hoped that the findings would inform future coach intervention and education design. Finally, the intention of the current research was to improve the quality of coach intervention research by assisting researchers to adopt the MRC guidelines within future research and providing them with a clear example of how to do this.

Chapter 2

Developing a complex coach intervention: a need supportive psychological skills intervention

Chapter 2 Abstract

The purpose of the study was to trial a coaching PS intervention following the suggestions of the MRC guidelines (Craig et al., 2008). A sample of 10 coaches (M years coaching = 10.4) and 74 athletes who they coached (predominantly competing at a regional level), agreed to participate in the study. As the guidelines suggest, the intervention delivery was underpinned by relevant theory (Self Determination Theory: SDT, Ryan & Deci, 2002) to be a need supportive mentoring programme. A mixed method approach was adopted in order to establish the intervention outcomes, any feasibility issues and then compare processes and outcomes between contexts to establish the key components of coach change.

The results demonstrated that the intervention increased coach encouragement of PS, some athletes' use of PS and some athletes' training behaviours. Additionally, unintended outcomes were also evident (e.g., changes of coach employment and further dissemination regarding PS). The study's process evaluation highlighted that the intervention was need supportive, however multiple improvements were identified to maximise the effectiveness of a subsequent intervention in Chapter 4. The experiences of different participants on the intervention were compared and an intervention process model (e.g., Mosleh, Kiger, Campbell, 2009) was created to indicate the active ingredients of coach change to be addressed and evaluated in the subsequent intervention. The model featured coach understanding of PS, coach need satisfaction, coach self-discrepancies, coach attitudes, coach intentions to coach PS and coach procedural knowledge. Therefore, this study provided insights into the necessary improvements required for the need supportive coaching PS intervention to impact most effectively on coach and athlete outcomes. As intended, this study provides an example of improved intervention development and improves the effectiveness of the large-scale intervention in Chapter 4.

Chapter 2

Coaches play a substantial role in the development of talented athletes by shaping their beliefs, cognitions and behaviours (e.g., Durand-Bush & Salmela, 2002). Given this pivotal role, coach-focussed interventions aimed at optimising athlete development are vital in elite sport (Trudel, Gilbert, & Werthner, 2010). However, recent reviews of the coach intervention literature (Langan et al., 2013; Trudel et al., 2010) have illustrated that empirically tested interventions are low in number, frequently lack rigour and theoretical underpinning (although see Coatsworth & Conroy, 2006; Smith et al., 1979; Smith, Smoll, & Cumming, 2007; Smoll, Smith, Barnett, & Everett, 1993 for exceptions), and have minimal impact on the actual coaching delivered (Trudel et al., 2010).

A particularly challenging area for coaches where further intervention research is required is the coaching of psychological skills (PS; e.g., self-talk, imagery, relaxation and goal setting). Indeed, despite coaches frequently recognising the well-known benefits of PS use on the quality of athletic training and performance (e.g., Neil, Mellalieu, & Hanton, 2006; Woodman, Zourbanos, Hardy, Beattie, & McQuillan, 2010), PS are rarely included in actual coaching sessions (Paquette & Sullivan, 2012). As with other areas of coach intervention research (Langan et al., 2013), the research base relating to the coaching of PS and increasing its occurrence is limited. To date, there are only six published interventions which involve the coaching of PS in sport psychology journals (Callow et al., 2010 *study 1 & 2*; Edwards, Law, & Latimer-Cheund, 2012; Hall et al., 2007; Hall & Rodgers, 1989; Harwood, 2008). Of these interventions, only two used a control group (Callow et al., 2010; Edwards et al., 2012), most relied upon unvalidated self-report measures and/or coach interviews, and only one study attempted to obtain athlete data to examine if intervening with coaches actually had an impact on athletes (Callow et al., 2010). In addition, the results of these interventions have been equivocal. Specifically, whilst some interventions have produced positive outcomes, such as

A COACHING PS PILOT INTERVENTION

positive attitudes towards PS, coach behaviour regarding PS often remains unchanged (Edwards et al., 2012; Harwood, 2008). Further, some workshop interventions may have actually decreased coaches' perceptions of their competence to deliver PS (Callow et al., 2010). Coaches are well placed to provide PS training due to; their rapport with athletes (Philippe, Sagar, Huguet, Paquet, & Jowett, 2011); their in-depth sport knowledge (Taylor, 1995); and the quantity of contact time they have with athletes. However, despite the forty-plus years of investigations into PS training delivered by psychology-trained practitioners, little is known about the nature of effective coach-delivered PS training and how to facilitate it. Clearly, more rigorous, theoretically informed intervention designs are needed to understand how to increase the coaching of PS. Therefore, the aim of the current study was to develop an effective coaching PS intervention and provide an example of improved rigour within coach intervention research.

The limited number of coach interventions have mostly focussed on increasing a coach's knowledge in particular subject areas such as imagery, communication, confidence and team building (e.g., Harwood, 2008; Newin, Bloom, & Loughhead, 2008; Smith, Smoll, & Barnett, 1995). However, interventions which solely intend to increase coach knowledge do not necessarily create changes in the coaching delivery because there are multitude of other factors which can influence coach behaviour. In particular, PS research suggests that engagement in the coaching of PS is influenced by: coaches' confidence to coach PS (Callow et al., 2010; Edwards, Law, & Cheung, 2012); previous practical experience of PS (Harwood, 2008) attitudes towards Sport Psychology (Martin, Lavalley, Kellman, & Page, 2004); and coaches' views on athlete training priorities (Watson & Clement, 2008). Given the multiple factors (alongside coach knowledge) which can contribute to, or prevent coach behaviour change and subsequently affect athlete outcomes, many coach interventions (and particularly

A COACHING PS PILOT INTERVENTION

PS interventions) could be aptly described as a complex behaviour change interventions rather than education or knowledge provision.

Complex behaviour change interventions greatly benefit from careful development and piloting in order to design and test delivery protocols. In areas of complex applied research, such as medical interventions, intervention development is considered of great importance:

The neglect of adequate development and piloting work, or proper consideration of the practical issues of implementation, will result in weaker interventions, that are harder to evaluate, less likely to be implemented and less likely to be worth implementing (Craig et al., 2008, p.4).

Unfortunately within the coach intervention literature such an approach to intervention design is seldom used despite the substantial risks associated with inadequate intervention development. To the best of the present author's knowledge only Edwards, Law and Latimer-Cheung (2012) have reported any form of pilot work in the development of their coach intervention. More of an emphasis on piloting and development within coach PS interventions could resolve issues which have affected previous research findings such as; a lack of theory underpinning intervention delivery, the aforementioned unaddressed barriers hindering coach behaviour change and poor response rates (Callow et al., 2010; Langan et al., 2013).

Given the weaknesses in the coach intervention literature, guidance is required to assist researchers to choose the appropriate methods of intervention development. Such guidance is available within medical intervention research, which is readily informed by Medical Research Council (MRC) guidelines (Craig et al., 2008) and the surrounding literature (e.g., Haynes, 1999). Therefore, in order to advance the quality of coach intervention research, we used the MRC guidelines as a framework to draw from, which has not previously been reported in a sport psychology context.

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The MRC guidelines (Craig et al., 2008; Hardeman et al., 2005) suggest that before undertaking and then evaluating a substantial complex intervention, researchers should (a) develop interventions systematically using the best available evidence and appropriate theory, (b) pilot interventions to resolve any feasibility or design issues using a mixture of qualitative and quantitative methods, and (c) use theory and evidence from the pilot study to causally model the intervention (see Mosleh et al., 2009 for example within a medical rehabilitation intervention). Causally modelling an intervention involves explicitly depicting the intervention process, via which the intervention addresses issues (e.g., coach confidence to coach PS) and creates the appropriate outcomes (e.g., increased effectiveness of athlete use of PS). An intervention model is normally displayed as a flow diagram which intends to describe over time how each of the active ingredients (the key elements which affect intervention outcomes) are facilitated through the intervention. According to the MRC guidelines, a causal intervention model can enhance an intervention's efficacy by making facilitative delivery components explicit and by encouraging assessment of the intervention process to understand not only *how* effective the intervention was, but *why* the intervention was effective or not (Craig et al., 2008; Hardeman et al., 2005). The MRC guidelines also advocate the investigation of the unintended impact of an intervention, as uncaptured changes (worthwhile or impeding) could critically influence the genuine value of the intervention. With these issues in mind, we conducted the current mixed methods study to pilot a theory-driven PS intervention in order to understand the intervention's feasibility, outcomes (intended and unintended) and the intervention's active ingredients to create a causal model of the subsequent full-scale intervention.

In terms of theoretical underpinnings, we used Self Determination Theory (SDT; Ryan & Deci, 2002), a well-established theory of human motivation and behaviour, to inform the development of the current intervention model. SDT proposes that individuals have three

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innate psychological needs; autonomy (to be the originator of one's behaviour); relatedness (to feel social connections with others); and competence (to feel effective in one's environment). An individual's (such as a coach) basic needs can be satisfied or thwarted by environmental conditions and the satisfaction of these needs is predictive of an individual's intrinsic motivation and autonomous engagement in specific behaviours (Reeve et al., 2004). Furthermore, the extent to which socio-contextual conditions provide autonomy support (the promotion of choice and recognising the perspectives of the learners), structure (making expectations and outcomes apparent and providing clear feedback) and interpersonal involvement (the quality of the relationship between facilitator and learner) corresponds to increases in an individual's need satisfaction which impacts on their motivation and behaviour (e.g., Edmunds, Ntoumanis, & Duda, 2008; Markland & Tobin, 2010).

Within coach interventions specifically, low levels of need support and coach need satisfaction could explain the lack of behaviour change in regard to PS. Most previous coach interventions which have included PS have been delivered using a workshop format; short 1-2hr information providing events with numerous attendees (e.g., Callow et al., 2010, (Study 1); Edwards et al., 2012; Harwood, 2008). From a SDT perspective, the lack of need support (autonomy, structure and interpersonal involvement) during workshops may have limited coach behaviour change, as during these workshops there may have been limited opportunities for coaches to develop close relationships, gain contextually relevant feedback about their coaching of PS and individually input and drive the workshop content. It is therefore likely that coaches' basic needs for relatedness, competence and autonomy were not adequately satisfied during workshop forms of coach PS education to initiate behaviour change. Conversely, a form of coach interventions which could facilitate behaviour change more successfully than group workshops, are individualised coach interventions (Callow et al., 2010; Cruz, Torregrosa, Sousa, Mora, & Viladrich, 2011; Sousa, Smith, & Cru, 2008).

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Indeed, as a result of the findings regarding their workshop PS intervention, Callow et al., (2010) tested an alternative individualised approach to coaching PS. In order to increase coach encouragement of imagery coaches participated in a five session, one to one mentoring programme. An initial need analysis allowed each coach to identify areas of coaching imagery which they wanted to work on (e.g., using imagery pre-tournament) via performance profiling and the subsequent sessions were tailored to the individual's profile. Coaches were also supported to incorporate imagery into a typical coaching session with athletes as a key opportunity to be observed and gain feedback regarding their provision of PS. Inspection of the results revealed that the intervention increased the coaching of imagery and improved coach perceptions of their knowledge and competence on their self-rated profiles. Although levels of need support were not tested by Callow et al. (2010), the positive results, in comparison to a workshop approach, could have been due to higher provision of coach autonomy, structure and interpersonal involvement during the more individualised intervention.

The nature and impact of need supportive interventions on levels of coach behaviour change and in this case, coaching of PS is yet to be tested. To further understanding of need supportive coaching PS interventions, a longitudinal intervention specifically designed to satisfy coaches' psychological needs, increase the coaching of PS and positively impact on athletes is required. According to the MRC guidelines (Craig et al., 2008) such a complex intervention involving both coaches and athletes and difficult behaviours, should be piloted, so that a large scale study is more likely to facilitate positive outcomes.

The purpose of the current study was to develop an effective coaching of PS intervention via a thorough piloting phase; providing an example of improved rigour within coach intervention research. Therefore, the piloted PS intervention was informed by SDT and gathered evidence regarding the **intervention process** and **intervention outcomes**, in order

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to accurately create an intervention model. Specifically, we evaluated the effect of a longitudinal pilot intervention on a single group of coaches using quantitative and qualitative data. The data was collected from participating coaches and the athletes they coached to compare pre-test and post-questionnaire data, and analyse follow-up interviews.

We collected data from multiple sources with the intention of understanding the **intervention outcomes** and the **intervention process** from a number of perspectives. In order to understand intervention effectiveness relating to important outcomes, it was important to obtain information regarding coaching behaviour and also the impact on athletes' use of PS and training behaviours and attitudes. The **intervention outcomes** investigated were the *intended outcomes* of (a) coach behaviour change; the increased coach encouragement of PS, (b) increased athlete PS use, and (c) improved athlete training behaviours and attitudes, and any *unintended outcomes* as unforeseen effects created by the intervention. The **intervention process** was investigated to establish whether the intervention was delivered as intended and to further understanding of the intervention's active ingredients. These *hypothesised active ingredients* were need support experienced (by coaches) during intervention participation and coach confidence to teach PS. The **intervention process** was also assessed by establishing other *emergent active ingredients*.

For the **intervention outcomes**, we hypothesised that the *intended outcomes* which were measured quantitatively would all be significantly greater post-intervention when compared to pre-test levels. More specifically, athlete ratings of coach encouragement of PS, athlete use of the specific PS and athlete training behaviour and attitudes would be significantly greater than at pre-test. Furthermore, the increases in coach encouragement and athlete use of PS should be significantly greater for the specific PS developed during programme than the PS not developed during the programme (see intervention details for more information on developed vs undeveloped PS). We hypothesised that these increases in

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intended outcomes would be reflected in the qualitative analysis of the interviews. The *unintended outcomes* of the intervention were established during the coach and athlete interviews and subsequent qualitative analysis.

In terms of **intervention process**, the quantitative measures of the *hypothesized active ingredients* (coach need support and coach confidence) were predicted to increase significantly between pre-test, mid-test (during the intervention) and post-test. The qualitative interviews provided a more detailed investigation of experiences of practitioner need support (Markland & Tobin, 2010) and coach confidence and how they influenced the intervention outcomes. We also obtained information regarding other *emergent active ingredients* (non-SDT) during the coach and athlete interviews.

The **intervention outcomes** and experiences of the **intervention process** of the individual athletes and coaches were then summarised as cases, and patterns within and across cases were compared (Ragin, 2000). We used this analysis to establish the uniqueness and communalities between different coaches and their athletes, regarding intervention outcomes and multiple active ingredients. The case patterns that were obtained highlighted the active ingredients influencing outcomes which were then included in a proposed intervention causal model. Based on the intervention model and findings from the study, we proposed improvements to increase the feasibility and efficacy of the subsequent intervention.

Method

Participants

Coaches. The Home Country National Institute of Sport identified 12 elite coaches (Female, 5; Male, 7; *M years experience coaching* = 10.4, *SD* = 8.79; *M age* = 36.10, *SD* = 12.80) who were coaching performance-level athletes in a region of the UK and were deemed to be a priority for investment according to performance potential. The coaches worked in a

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range of sports (Track and Field, Soccer, Field hockey, Canoe Slalom, Olympic Weightlifting, Rugby Union, Ice Skating, Dressage Horseriding, Table Tennis, Sailing). The lead author telephoned each coach to establish their interest in participating in the study ($n = 2$ were not interested due to imminent changing circumstances). Ten coaches agreed to participate, including eight professional coaches and two volunteer coaches. All ten coaches had coaching qualifications of UKCC or equivalent ($n = 2$ level four; $n = 2$ level three; $n = 5$ level two; $n = 1$ level) and three of the coaches had previous experience of working with a Sport Psychology Consultant. Two coaches withdrew from the programme during the study due to changes of employment.

Potential participants in the follow-up interviews were identified using purposeful sampling (Patton, 2002) in order to select informative and illuminative cases for the maximum variation of experiences. Coaches who showed a variety of responses to the intervention (two coaches who completed all sessions, two coaches who had missed at least one session and one coach who withdrew from the programme) were invited to take part in follow-up interviews ($n = 5$ in total with 4 agreeing to be interviewed)

Athletes. Coaches were asked to recruit approximately five athletes they coached to take part in questionnaire completion. A total of 74 athletes agreed to participate in the study ($M age = 16.0$, $SD = 5.8$, $n = 54$ male, $n = 20$ female). The athletes recruited were predominantly competing at a regional or county level ($n = 9$ international, $n = 9$ national, $n = 50$ regional, $n = 3$ club/recreational). Informed consent was obtained prior to participation in the study, and coaches provided consent for any athletes under 16 as the adult in care of the young people. For the follow-up athlete interviews we used purposive sampling by asking the coaches being interviewed to identify athletes who had either responded well or poorly to their coaching of psychological skill use, a total of six athletes were invited to be interviewed ($n = 2$ male, $n = 4$ female).

Measures

Intervention outcomes.

Coach Encouragement of Psychological skills (CEPS). Coaches' encouragement of athlete psychological skills (Jedlic et al., 2007) was measured using the CEPS, a scale created by adapting items from the TOPS3 training and competition subscales. Two versions of the CEPS were created; an athlete questionnaire (e.g., my coach encourages me to practise using relaxation techniques at workouts) and a coach questionnaire (e.g., I encourage my athletes to practise using relaxation techniques at workouts). Only the items relating to the four basic PS (goal setting, imagery, relaxation and self-talk) were used along with additional items which were added to the imagery and goal setting scales to provide more comprehensive information (see Appendix A). On both versions of the questionnaire there were 37 items in total, and each item was rated on a five-point Likert scale from 1 (*never*) to 5 (*always*). The items were scrutinised for face validity by three researchers with expertise in PS and questionnaire design, and minor adjustments were made. We the athlete version of CEPS was analysed in order to establish athletes' perceptions of coach behaviour change, however, the coach version was completed solely as an exercise to enhance coach awareness and so was not analysed. In the current study, the CEPS (athlete version) revealed adequate internal consistency with all training and competition subscales (goal setting, imagery, relaxation and self-talk) with Cronbach alpha coefficients between .63 and .93.

Test of Performance Strategies 3 (TOPS3). The TOPS3 (Thomas, Hardy, & Murphy, in prep) is an updated version of TOPS 2 questionnaire (Hardy, Roberts, Thomas & Murphy, 2010). The TOPS3 measures athlete use of mental strategies in competition and training environments. Only eight of the subscales were used to measure the use of each of the four basic PS (goal setting, imagery, self-talk and relaxation) during *training* and *competition*. As these were the PS covered on the intervention. The TOPS3 comprises 34 items which are

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rated on a five-point Likert scale from 1 (*never*) to 5 (*always*). Whilst the model fit of the TOPS3 has yet to be confirmed, the TOPS2, upon which this new measure is based, has received substantial psychometric validation and has produced good model fits for both competition and training subscales (see Hardy et al., 2010). In the current study, the TOPS basic PS subscales (both in competition and training) revealed adequate internal consistency with Cronbach alpha coefficients between .60 and .98.

Athlete Training Behaviours (TTABQ). The Trait Training Attitudes and Behaviours Questionnaire (TTABQ; Oliver, 2009) contains seven subscales; professional behaviour, professional attitude, motivation, coping, seeking improvement, effort outside of training (“effort-extra”) and effort in training sessions. The questionnaire was developed from a qualitative study with elite coaches (Oliver, Hardy, & Markland, 2010) and the questionnaire was shown to have acceptable model fit (Oliver, 2009). The TTABQ was originally designed for athlete completion, however to avoid self-report we adapted it to be completed by coaches, allowing them to rate each of their athletes according to how the athlete usually trained (e.g., This athlete always turns up with the correct kit for training). The items were scored on a Likert-type scale ranging from 1 (*strongly agree*) to 7 (*strongly disagree*). In the current study, the TTABQ (coach version) revealed adequate internal consistency with Cronbach alpha coefficients of ranging from .69 to .93 for all subscales.

Intervention process.

Coach-rated Need Support. We adapted Markland and Tobin’s (2010) measure of needs support for this intervention to measure coach perceptions of need support provided by the programme facilitator (PF). The items referred to the extent to which the PF promoted autonomy (e.g., provided choices and options), structure (e.g., made it clear what to expect from engaging in the activities with her), and involvement (e.g., was concerned for coach

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well-being). The responses to the items were scored on a five-point scale from 0 (*not true of me*) to 4 (*very true of me*; see Appendix B).

Need Support Observations. The PF was observed working with the coaches on two occasions by her supervisor (a chartered psychologist and Health Care Professions Council registered Sport and Exercise Psychologist). During these observations the PF's behaviour was observed and rated using a SDT derived checklist of practitioner behaviour (Reeve et al., 2004) measuring the provision of structure (4 items), autonomy (4 items) and involvement (4 items) during sessions. Each item was rated on a 1 to 7 scale, with specific bipolar descriptions as anchors for each item, (e.g., 1 = *controlling language*; controlling, coercive; 7= *informational language*, flexible, not at all controlling). The checklist was initially derived to be used with school teachers during lessons, and so was modified slightly here to refer to the PF in the current context with coaches. However all the items remained the same (Appendix C). Reeve et al.'s (2004) research showed the scale to have good internal consistency ($\alpha = .81$ to $.90$) and predictive validity.

Coach Confidence to teach psychological skills (CCTPS). The CCTPS was designed for the present study, drawing from previous coach education investigations (e.g., Callow et al., 2010) as well as relevant literature (Munroe, Hall, Giabocchi, & Weinberg, 2000). Five items were developed measuring coach confidence in their knowledge of when, where, why, what and how *to teach* psychological skills to their athletes were developed (e.g., "I am confident that I know how to teach my athletes to use psychological skills"). All items were scored on a 1-9 Likert-type scale from 1 (*Not at all*) and 9 (*Very much so*). In the current study, the CCTPS revealed good internal consistency, $\alpha = .95$.

Procedure

Intervention procedure. The intervention consisted of nine consecutive stages involving six intervention sessions and three data collection points. The details of each stage

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are provided in Table 2. , each coach completed five to six sessions with the PF which took an average of 10.8 hours ($SD = 3.03$). At data collection points, the PF distributed the athlete and coach questionnaires and anti-social desirability instructions were given to respondents. The athletes and coaches completed the questionnaires in their own time and placed the completed questionnaires into sealed envelopes which were returned to the PF by each coach.

Table 1

The specific PS developed (with PF) and PS not developed during the intervention

Coach no.	Gender	PS Developed	PS not Developed
1	F	Relaxation; Self-talk	Goal setting; Imagery
2	F	Goal setting; Relaxation	Imagery; Self-talk
3	F	Imagery	Goal setting; Relaxation; Self-talk
4	M	Self-talk	Imagery; Relaxation
5	M	Imagery; Self-talk	Goal setting; Relaxation
6	M	Imagery	Goal setting; Self-talk; Relaxation
7	M	Goal setting	Imagery; Relaxation; Self-talk
8	M	Relaxation	Goal setting; Imagery; Self-talk
9	M	Goal setting (left the study)	Imagery; Relaxation; Self-talk
10	M	Goal setting (left the study)	Imagery; Relaxation; Self-talk

PF= Programme Facilitator

The intervention was designed to maximise the provision of need support (autonomy, structure and interpersonal involvement; Markland & Tobin, 2010) and mastery experiences, as detailed below in Table 2. Specifically interpersonal involvement was provided via one to one mentoring sessions between the PF and coach, organised at times and places that were convenient to the coach. Furthermore, for the purposes of increasing interpersonal involvement and gaining coach buy-in to the intervention, questionnaire completion took

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place after the observation and profiling session had occurred (Fifer, Henschen, Gould & Ravizza, 2008). Autonomy support was provided by ensuring coaches led decision making over programme content via performance profiling (Butler & Hardy, 1992; Jones, 1993) and facilitated discussion with PF. Therefore coaches were given a choice about which skills were developed during the intervention and which were not developed, hereafter referred to as undeveloped (see Table 1 for psychological skills chosen by each coach). Structure was provided by clarifying the aims of the each intervention session using an intervention flow chart, providing clear explanations of PS training and its outcomes, and giving feedback to coaches regarding their coaching PS.

Furthermore, to increase coach perceptions of their competence to coach PS, the coaches were provided with mastery opportunities (Bandura, 1997) throughout the intervention. In particular, the coaches were encouraged to experience using PS first hand in order to increase coaches' familiarity with PS and therefore their feelings of competence coaching PS (Gould, Medbery, Damarjan, & Lauer, 1999).

Table 2

Intervention procedure including the purpose and format of the nine stages

Week no.	Session format and duration	Provision of needs support
1	Observation of coaching session 1 (60-90mins of coaching observation; 20 mins one to one discussion with PF)	i)*Rapport building ii) * <i>Enhancing PF's understanding of the context</i> i) <u>Increasing coaches' understanding of the intervention and potential benefits.</u>
4	Coach needs assessment session 2 (120-180mins one to one session with PF) a) Coach informed consent & anti-desirability instructions b) <i>CEPS</i> completed by coach c) Coach reflection on <i>CEPS</i> responses d) Coaching PS profiling, PS topics selected. e) Coach completion of <i>CCTPS time1</i>	i) <u>Increase coaches' understanding of PS</u> ii) <u>Increase coaches' self-awareness regarding their coaching and PS</u> iii) <u>#Foster feelings of competence by identifying where coaches already engaged in coaching of PS.</u> vi) * <i>Facilitate coaches to make choices about programme content</i>
4-6	Time 1 questionnaire completion a) Athlete informed consent & anti-desirability instructions	

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	b) Athletes completion of <i>TOPS3</i> , <i>CEPS</i> , <i>TTABQ</i> c) Coach completion of <i>TTABQ</i>	
7-9	Information session 3 (120-180 mins; One to one session with PF) a) PS information presented informed by session 2. b) Multiple coaching of PS strategies introduced c) Coach use of the skill/technique in session and at home	<u>i) *Individualised, coach relevant information of PS</u> <u>ii) Clarify the positive outcomes of coaching PS</u> <u>iii) Provision of a choice of ways to coach PS</u> <u>iv) #Provide the coach with mastery experiences of PS</u>
9-12	Planning session 4 (One to one discussion with PF; 50-120 mins) a) Review of PS information & coaches' experiences of PS b) PF assisted coach to plan the coaching of PS (when, where, how). c) Feedback provided by PF and necessary adjustments were made to plan.	<u>i) #*Consolidate the coach knowledge and acknowledge coaches experiences of PS</u> <u>ii) facilitate the creation of a specific plan of behaviour change (coaching PS)</u> <u>iii) *Recognition of coach ideas regarding behaviour change</u> <u>iv) #*Provide feedback to coaches.</u>
10-14	Supervised coaching of PS Session 5 (60-90mins observation; 20 mins one-to-one discussion with PF) a) Coach delivery of PS to athletes based on session 5 plan. b) PF observed coaching PS and contributed if requested. c) Discussion: coach reflection and PF provision of feedback. d) Coach planning of future coaching PST. e) Coach completion of <i>CCTPS time 2</i>	<u>i) #Coach gaining mastery experience of coaching PS.</u> <u>ii) *Provision of reflection and feedback opportunity.</u> <u>iii) Increased quality of coaches PS delivery</u> <u>iv) Facilitated coach planning for ongoing PS & maintenance.</u>
14-15	Information session 6 (60-120 mins; one to one session with PF as stage 4 and 5)	(stage 4 and stage 5 repeated as one session)
19-23	Time 3 questionnaire completion a) Athletes completion of <i>TOPS3</i> & <i>CEPS</i> b) Coach completion of <i>TTABQ</i> , <i>CCTPS</i> and needs support questionnaire.	
30-50	Follow-up coach & athlete interviews	

Note. *=Relatedness; *Autonomy*; Structure; #=Mastery experiences, PF= Programme Facilitator

Interview procedure. For the coach and athlete interviews semi-structured interview guides were used (see Appendix D), thereby providing consistency across interviews whilst allowing flexibility to pursue directions of interest. Probes were established *a priori*, in order to deepen interviewees' responses to questions if required (Patton, 2002). Four researchers

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experienced in qualitative research and coach interventions scrutinised the initial interview guides. An advisor from the key stakeholder, The Home Country National Institute of Sport, then assessed the relevance of the interview guides, which were amended accordingly. In order to reduce biasing of participant responses, an external interviewer (trained in qualitative research and with six years' experience of intervention research) who had not been involved in the intervention delivery conducted pilot and final interviews. Pilot interviews were carried out with a team sport coach (male, aged 30) and two athletes coached by him (males, aged 17) who had been involved in the intervention. At this point, it had already been decided that full-scale intervention delivery would not involve participants of interactive team sports (see chapter 4 for more details), so these individuals' experiences were more useful for piloting the interview format, than informing future implementation. The pilot interviews were reviewed by the interviewer and members of the research team and final adjustments were made.

The PF telephoned selected coaches to invite them to be interviewed and asked coaches to reflect on their experiences of the intervention prior to the interview. The interviews were conducted face to face at a convenient, quiet meeting place (e.g., a sports centre or University meeting room). At the end of the coach interview, the interviewer asked coaches to identify an athlete who had responded poorly or well to their encouragement of psychological skills. These athletes were invited to be interviewed and subsequently met the interviewer in their home, at the University or at their training venue. The coach interviews lasted an average of 90.6 minutes ($SD = 20.40$) and the athlete interviews lasted an average of 54.41 minutes ($SD = 8.28$). One athlete was interviewed for a second time over the telephone for 25.01 minutes in order to clarify conflicting reports between her interview and her coach's interview. The interviews were recorded using Adameus software, transcribed verbatim and proof-read. The PF emailed the coaches and athletes copies of their transcripts

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and offered them the opportunity to verify or amend their transcripts. Three coaches replied to the email and requested no amendments.

Data Analysis

Quantitative Analysis. We assessed the **intervention outcomes** and **intervention process** statistically via analysis of questionnaire responses. It is important to note that to analyse changes in the coaching of PS (via the CEPS) and athlete use of PS (via the TOPS) the responses regarding different PS were compared over time. Each coach only worked on specific PS during the intervention (see Table 1 for details) and therefore the combined means for the specific PS worked on during the intervention and the combined mean scores for the PS not covered during the intervention were analysed using two-way (PS; developed/undeveloped \times time; pre/post) fully repeated measures ANOVAs to compare pre and post-test levels of athletes use of PS. .

To analyse changes in coach reports of each of the seven athlete training behaviours we used paired sample *t*-tests (pre-test/post-test). Conducting multiple T-tests can increase Type I errors by capitalising on chance therefore it is recommended to use a Bonferroni correction to make the significance levels more stringent. However, this correction was not thought appropriate, due to the already small sample size ($n = 27$) weakening any potential effects. Furthermore, clear directional *a priori* hypotheses were specified for each training behaviour and so if the hypothesised effects were obtained then it would have unlikely to have been obtained by chance, as chance effects would have been random in direction (cf. Hardy et al., 2010). Therefore, *t*-tests were appropriate in this instance.

It has increasingly been suggested that evaluating the outcomes of interventions on the basis of probabilities which lie above or below a cut off (e.g., $p < 0.05$) has serious flaws (Cumming & Finch, 2001). The significance of findings is highly dependent on sample size, as overpowered studies with large samples can produce outcomes that are “statistically

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significant” but have little meaning, and conversely results that are “not statistically significant” can display meaningful differences. As an alternative to significance levels, effect sizes can be referred to as metrics of meaningfulness (Cohen, 1988). An effect size is an expression of the difference between groups as a fraction of the variability between participants (or the *SD*). Effect sizes of Cohen’s *d* (*d* : Cohen, 1992) are normally evaluated as trivial (0- 0.19) small (0.20-0.49) medium (0.50- 0.79) and large (0.80 and greater). In the same way effects sizes of partial-eta squared (η^2) can be considered to be small (0.1) medium (0.59) and large (1.38; Cohen, 1992). For this study, as with medical interventions (Angst, Aeschlimann, & Stucki, 2001), the effectiveness of an intervention was considered relative to the minimum clinically (or practically) important difference. This difference signifies the smallest change in outcome measures that must occur for the intervention to be considered effective, which is usually equivalent of an effect size of 0.20 or above (cf. Winter, Abt & Nevill, 2014). An effect size of 0.20 is small, but does indicate some form of change has occurred. Within an elite sample, where coaches and athletes are high performing, a small change could make a substantial difference to performance outcomes. Thus, in the current study effect sizes of 0.20 or above were considered to signify practically meaningful differences in outcomes as a result of the intervention. To strengthen the interpretation of data, we considered the effect sizes alongside significance testing and the qualitative findings.

Qualitative Analysis. The external interviewer, PF and a third investigator analysed the interviews using thematic analysis known as framework analysis (Richie & Spencer, 1994). Framework analysis is a matrix-based method specifically designed for applied research and is commonly used to evaluate interventions (Yardley et al., 2006). Framework analysis is an integrated approach using a deductive *a priori* framework of categories based on the study’s hypotheses, followed by inductive development of the framework to incorporate emerging information (Miles & Huberman, 1994). This analysis has not

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previously been used in sport psychology research and was selected as it enabled a targeted approach to *apriori* hypotheses and transparent data management, which retained connection with the raw data (Ritchie, Spencer, & O'Connor, 2003) and facilitated cross-case analysis (Richie & Spencer, 1994).

Firstly the PF and the interviewer familiarised themselves fully with the data (Richie et al., 2003) via transcription, re-listening to the interviews where necessary and discussions of interview content. An initial thematic framework was then created as a numbered index of categories, based on the study hypotheses and initial impressions of the interview data. Portions of transcripts which referred to relevant categories were identified and labelled with the appropriate index number(s). New framework categories were created or refined to incorporate emergent themes, and where multiple categories were applicable to a section of text, multiple index numbers were applied. To enhance the dependability and credibility of the analysis (Lincoln & Guba, 1985) the interviewer and PF performed the indexing separately, who then met on five occasions to compare the indexed transcripts and amend the framework categories to improve clarity. There were minor discrepancies found which were resolved by relistening to the interview recording and discussing the intended meaning of the specific phrase at the time.

Following this validation process, indexed quotations were charted into cases¹ and theme tables in excel spreadsheets to retain information regarding the datas' unique context. The abbreviated phrases of the participants were placed in the appropriate category cell², along with the transcript page number(s), so that the original text could be easily identified. Where a quotation was deemed to be relevant to multiple categories it was placed in multiple cells or spreadsheets, thus maximising the insights from the transcripts. Following the

¹ A single case was made up of an individual coach and the specific athletes he/she coached

² Care was taken at each stage of data management to retain the original voice of the participants as suggested by Richie and Spencer,(1994)

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charting process, the material was summarised into broader key themes. As a process of dependability (Patton, 2002) the PF's supervisor carried out a blind review by examining a sample of the summarised findings, and referring to the original section of transcript in order to assess the appropriateness of each summary. The PF and supervisor then engaged in three meetings to discuss and resolve any points of disagreement or clarification.

The PF carried out pattern analysis (Ragin, 2000) on the summarised data. Firstly, the intended and unintended outcomes of the intervention for each case (both athletes and coaches) were established and the qualitative data were then compared and contrasted with the quantitative data. Subsequently, the hypothesised and emergent active ingredients (e.g., context, attitudes, experience on programme) were identified. The active ingredients and outcomes were then displayed in time-ordered tables (Miles & Huberman, 1994) so that each case's experiences over time and outcomes could be understood. All of the cases were then compared and differences between cases regarding the experiences of active ingredients and the subsequent outcomes were highlighted. The patterns established the influential active ingredients across cases which were placed in time-order to create the proposed intervention model. Further, methods of facilitating each active ingredient during intervention delivery were described.

Results and Discussion

Each results topic has separate sections reporting quantitative results where measured, then qualitative data, followed by a summary of findings. The **intervention outcomes** reported were; *the intended outcomes* of, the increased coaching of PS; athlete use of PS , athlete training behaviours and coach PS behaviours impacting on athletes' PS use; and *the unintended outcomes* of the intervention. **Intervention processes** reported were; *hypothesised active ingredients*; levels of need support coaches experienced and levels of coach confidence to teach PS, and *emergent active ingredients* which influenced intervention

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outcomes. The key intervention processes within each case were then collated as case summaries and then compared to inform the intervention model. Based on the intervention model and findings from the study, improvements to increase the feasibility and efficacy of the subsequent intervention were then proposed.

Intervention Outcomes

Coaching of PS.

Coach Encouragement of Psychological skills (CEPS). For training, the ANOVA revealed no significant main effects for time, with $F(1,17) = 0.08, p = .77$, partial $\eta^2 = .01$ and skill $F(1,17) = 3.08, p = .10$, partial $\eta^2 = .15$ nor a significant interaction $F(1, 17) = 1.34, p = .26$, partial $\eta^2 = .07$ (see Table 3 for means and *SD*) with small effect sizes in each case. For competition, the ANOVA revealed a significant main effect for skill with as small but practically meaningful effect size $F(1,17) = 4.55, p = .05$, partial $\eta^2 = .21$. Of more central interest, a significant interaction, with another small but practically meaningful effect, was revealed $F(1,17) = 4.94, p = .04$, partial $\eta^2 = .21$. A Tukey's follow up test indicated a greater increase across time in encouragement of PS that were developed during the intervention in comparison to PS which were not developed.

Table 3.

Means and Standard Deviations of all intended outcome variables

Measure	Time 1 Mean	(SD)	Time 3 Mean	(SD)
Athlete rated CEPS (<i>training: developed</i>)	3.38	.79	3.50	.83
Athlete rated CEPS (<i>training: undeveloped</i>)	3.26	.90	3.25	.94
Athlete rated CEPS (<i>competition: developed</i>)	3.83	.78	4.28	.64
Athlete rated CEPS (<i>competition: undeveloped</i>)	3.52	.92	3.56	.97
Athlete TOPS (<i>training: developed</i>)	3.20	.95	2.98	1.01
Athlete TOPS (<i>training: undeveloped</i>)	3.25	.81	3.08	.72
Athlete TOPS (<i>competition: developed</i>)	3.54	.76	3.53	.91

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Athlete TOPS (competition: <i>undeveloped</i>)	3.56	.87	3.34	.77
Coach rated TTABQ: <i>Professional Attitude</i>	5.47	1.56	5.84	.90
Coach rated TTABQ: <i>Motivation</i>	4.98	.93	6.39	.51
Coach rated TTABQ: <i>Coping</i>	4.66	1.40	4.96	1.37
Coach rated TTABQ: <i>Effort In Training</i>	5.06	1.64	5.18	1.37
Coach rated TTABQ: <i>Extra Effort</i>	5.05	1.89	5.63	1.06
Coach rated TTABQ: <i>Respect</i>	5.47	1.63	5.75	.93
Coach rated TTABQ: <i>Seeking Improvement</i>	4.66	1.05	5.17	1.36

Coaching of PS: interviews reports. Regarding the coaching of PS, the interview data suggested that all four coaches perceived themselves to have increased their coaching of PS.

I made a point of working with (after PF visited for about a month) them absolutely using imagery as a part of every *exercise*, and you can see that now as more part of their sort of pre-competition, their *pre-performance* routine (Coach 3).

More specifically, two forms of coaching PS emerged from the coach and athlete interviews which were not detectable via the CEPS questionnaire; *targeted cueing of PS*, and *overt coaching of PS*. Targeted cueing (TC) of PS involved coaches giving athletes instructions of a psychological nature (i.e., a coach instructing an athlete to imagine the action before they attempt it), without necessarily providing any formal explanations surrounding PS and their use. In contrast, overt coaching of PS involved giving the athletes specific PS exercises, explanations and feedback about using PS appropriately (i.e., explanations, assistance and feedback regarding writing an imagery script). TC is a more subtle approach to coaching of PS than overt coaching such as “I tend to be very covert with how I do it.....all of my coaching takes place on the *field*, so you can’t exactly say to someone ‘right sit down, have a cup of tea, let’s talk about psychological skills’” (Coach 2).

So I had one athlete where I was, looking at her and every time I talked to her in that negative sort of tone it didn’t sink in, just everytime she did, she was always slanted

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and on a tilt so she wasn't using her optimal stride. So talkin, talking to the PF she, I said, well what you should be doing is perhaps giving a cue.....so urm when I went back and I went and saw this young girl I said to her, 'what I want you to do XXXX, is just look over the wall' right so that was. the next time she ran, she ran like that looking over the wall and I thought now that has taken me weeks and weeks and weeks. And yet finding the right cue, so I've started to actually think about how I talk to them (Coach 4).

Overt coaching of PS involves teaching athletes about what PS are and providing explanations about effective PS use such as showing "three of four different breathing techniques and I got into the habit of, of showing the athletes each of them and then letting them choose which worked for them and because I felt very much, they needed ownership over whatever they did (Coach 1)." Furthermore, Coaches differed in the extent to which they engaged in these two types of coaching PS, with Coach 1 and 2 reporting having both increased TC and overt coaching PS following the programme and Coach 3 and 4 reported solely increasing TC coaching of PS. The athlete reports of coaching PS matched those of the coaches, suggesting that their coaches had increased their TC of PS. However only Athletes 1, 2a and 2b suggested overt coaching of PS had increased due to the intervention.

And it wasn't till, like we didn't really do that much until *Coach 2* started working with *the PF*, she didn't really encourage use to that much. Apart from at competitions and stuff she didn't really think. It didn't become like an everyday thing (Athlete 2a).

Only one athlete (Athlete 4) failed to report any change in either type of coaching PS. "He's never really mentioned it (*PS*) to me because he knows I can do it on my own, and he knows that self, well I've taught myself really (Athlete 4)". Despite Athlete 4 suggesting that her coach had not altered his coaching of PS and did not overtly talk to her about PS, she gave examples of TC in the coaching she received "When I'm coming out of the drive phase he'll

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say right now think ‘tall’ so think like you have a bit of string on top of your head you know, like pulling a string (Athlete 4)”. Interestingly, both Coach 2 and the athletes she coached reported an increase in the overt coaching PS during the programme. However, between post-test and the follow-up interviews whilst Coach 2 continued to coach by TC, the overt coaching PS decreased.

I have to confess to not really speaking an awful lot about this kind of stuff (PS) with them, mostly because we have had some pressing goals to try and get to, with regard to qualifying for a competition, and so on, so this kind of, like got pushed a little bit to the wayside (Coach 2).

Summary of outcome: Coaching of PS. The CEPS questionnaire results indicated a practically meaningful and significant increase for coach encouragement of PS in competition. The coaching of PS did increase between pre-test and post-test, which seemed to be as a result of the intervention, particularly for the coaching of PS for competitions. All coaches seemed to have increased their coaching of PS via targeted cueing of PS (although one athlete didn’t report any specific changes), and some of the coaches had increased their overt coaching of PS. Finally, one coach and her athletes reported an initial increase in overt coaching PS following the intervention and then a recent reduction in the overt coaching of PS.

Athlete Use of Psychological Skills.

Test of Performance Strategies 3 (TOPS3). For training, the ANOVA revealed no significant effects of time $F(1, 23) = 2.4, p = .14$, partial $\eta^2 = .094$) with small decreases in psychological skill use between pre and post-test (see table 3) or skill development $F(1, 23) = 0.079, p = .78$, partial $\eta^2 = .008$). Similarly, for competition, the ANOVA revealed no meaningfully sized or significant effects of time $F(1, 19) = 0.917, p = .35$, partial $\eta^2 = .046$)

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or skill development $F(1, 19) = 0.151, p = .702$, partial $\eta^2 = .008$). There were no significant interactions found between time and skill development in training or competition.

Athlete use of PS: Interview reports. All athletes suggested that they had increased their PS use in training.

I think my seat's got better, I'm more stable than I used to be. I, and that, that is definitely down to the relaxation techniques. Because I, when I first get on the *equipment* I'd be very tensed up and course when I'd speed up, I'd be bouncing you know everywhere, but from doing the, the. As soon as I get on the *equipment* now I just tell myself to fully relax and just let it all drain away and I can feel myself actually sitting deep in the seat and it's like relaxing in an armchair now. Yeah it makes, it makes a massive difference (Athlete 1.)

Mental imagery. I mean I do a bit when I'm at home and sometimes I like, when things are still fresh in my mind like, I'll just lay on my bed with my laptop and just put the music on and just close my eyes and imagine us *doing* the routines (Athlete 2b).

Most of the athletes suggested their use of in PS in competition had increased. "I think my psychological preparation for my *events* has only really started properly this season and I think its helped me a lot" (Athlete 4). However, some athletes suggested that their PS in competition had decreased because they had not competed or trained recently:

Yeah well we used to do a lot (*goal setting*), a lot more than we do now. We need to get back into it cos we've actually got a competition coming up so we need to set goals towards it and. We don't, we haven't really set some for a while, cause, cos the *sports centre* has been shut and stuff so it's been hard to set them but, but we did, did do it regularly. We did it like every week and we had it, had it set up to the competition (Athlete 2b).

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Coach impact on athlete's PS use: Interview reports

Three athletes (1, 2a and 2b) suggested that their coaches impacted directly on their PS use via their increased coaching of PS. When Athlete 1 was asked “what influences your current use of mental skills when you’re training?” She said “remembering how well it’s gone when I’ve actually done it (*used PS skills*), when *Coach 1* has given me an instruction to do it (*use PS skills*), remembering how well and what a difference that made by doing that.”

Athlete 2a suggested that the coaching of imagery had helped her:

Coach 2 said imagine yourself on a camera once, so she asked me, ‘do you look at yourself like, if, as if you’re on a TV or do you look at yourself as if it’s through your eyes’, and then she explained how the different ones worked and how it would thingy, how it would help. So she, so I tried both of them and then she just suggested, she just suggested them and then it helped (Athlete 2a).

The other athletes (Athletes 3 and 4) suggested that their coach impacted their PS via TC instructing including cue words and psychologically based instructions, however, it remains unclear this was as a result of the intervention:

Before the race he does say, “think hit, think drive.”.....If I’m doing some starts or something like, I’ll think in my head “drive, drive, drive” and ill drive out of the blocks and ill say it in my head, while I’m running, so that really helps (Athlete 4.)

Coach 3 used to say to me was “why, you know, why don’t you use that aggression on the bar when you’re lifting it? you’re using it now, it’s, when it’s the wrong time.”

So that’s what I do now, if I miss a lift, I’ll just say, “right, I’ll get you next time” (Athlete 3).

All coaches reported that coaching PS had had a positive impact on their athletes’ performances.

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I used it again for an athlete who kept saying, “when I go into the arena I forget how to *move*, I can’t *perform*, I turn to jelly”. So you know we, we gave her a little bit of a, of a self-talk, a little tiny script, she only needed about a sentence, and sent her off with that and she texted me on Sunday “oh I’ve just had a brilliant *performance*, it’s gone really well (Coach 1).”

Finally, Coach 3 reported that despite participating in the intervention, not all athletes that he coached had improved their ability to use PS and perform under pressure:

As much as the PF helped me, and those people on the World Class pathway that was helping one of my athletes up in XXXX with, with Psychology. You know it’s still, catastrophe happened for that individual in *the games* and that was sad to see (Coach 3).

Summary of outcome: Impact of intervention on athletes’ use of PS. All coaches appeared to influence their athletes’ use of PS, and the intervention impacted on the athletes psychological skill use via increasing the coaching of PS. Conversely, some athletes reported that their more recent PS use had decreased as a result of decreased coaching of PS. Some athletes (Athlete 3 and 4) suggested their coach influenced their use of PS in a positive way but it remains unclear whether increases in PS use were due to the intervention enhancing the coaching of PS they received. The coaching of PS of Coach 1 and 2 seemed to have a clearer impact on athletes PS use in comparison to Coaches 3 and 4. These differences in impact could be linked to the types of coaching PS the coaches were delivering; Coaches 1 and 2 seemed to engage in more overt coaching of PS in comparison to coach 3 and 4 who solely engaged in TC of PS. As a result of receiving more overt coaching of PS, athletes 1, athlete2a, & athlete2b may have been more aware the coaching of PS that was occurring and therefore spoke more clearly about its impact during their interviews.

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The lack of meaningful effects and significant results from the TOPS do not seem to reflect the increases in PS use reported in the athlete interviews. A potential explanation for the discrepancies between interview responses and questionnaires could be related to the athletes understanding when reporting their PS use. An initial lack of athletes' understanding may have caused inaccuracies and overestimations when reporting their PS on pre-test questionnaires (see Table 6 for quotes regarding athlete awareness). Following the intervention, athletes would likely have greater understanding of skills they do and/or do not use regularly and as a result their mean ratings of PS use may have been more conservative. The decreased ratings of PS use associated with increases in knowledge of PS have been seen in other effective interventions (Woodcock, et al., 2010).

Athlete Training Behaviours.

Athlete Training Behaviour questionnaires (TTABQ). The behaviours which increased between pre and post-test (see Table 3 for means and SD) showing medium ($d > .30$) to large effects ($d > .80$) were; athlete motivation ($t(27) = -5.22, p < .00, d = 1.27$), seeking improvement ($t(27) = -2.04, p = .05, d = .42$) and extra effort ($t(27) = -1.96, p = .06, d = .38$). The other behaviours also increased across time but to a lesser degree showing small but meaningful effects sizes ($d < .30$); athlete's coping under pressure ($t(27) = -1.08, p = .29, d = .22$), professional attitude, ($t(27) = -1.45, p = .16, d = .28$) and respect ($t(27) = -1.14, p = .27, d = .20$). Effort within training only demonstrated a trivial effect ($t(27) = 0.38, p = .70, d = .08$).

Athlete Training Behaviours; Interview reports. The perceptions of athlete training behaviours varied between cases and between the coach and athlete reports. Two coaches (Coach 1 and Coach 3) reported improved training behaviours and attitudes of their athletes and indicated some changes in training behaviours as a result of coaching PS. "They have become a lot more focused in training because of the self-imagery and the self-talk." (Coach

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3). However, the other two coaches (Coach 2 and Coach 4) did not report any changes in athlete training. Indeed, Coach 4 suggested that his athletes training behaviours had always been positive. “I think that is hard to actually evaluate in, in terms of they’ve always turned up for me. I don’t know it’s like , I don’t have any problems of ‘where they’ve gone? or have they been here?’, they’re keen (Coach 4).”

However, all of the athletes, (except athlete 1) suggested that their motivation and effort and/or their ability to deal with setbacks in training had improved:

Last year I was like, every time I was injured I was just like “Oooh not again!”, but I think, if I get injured now, I’ll be like “Right, there’s nothing I can do, just get better and just, get back to training as soon as you can (Athlete 4).”

In particular, two athletes (2a and 2b) mentioned that their motivation and effort had improved due to engaging in more goal setting as a result of the intervention.

I feel we are a lot more determined now, and that’s probably from, like setting these goalsLike now I’m, I go for, I just kind of, I kind of do a lot more exercise and a lot more training, like voluntary like. A lot more of off *the field* work and stuff like that more voluntary instead of a being a bit more a laboured thing.” (Athlete 2b).

However, not all athletes’ reports of improvements to coping with setbacks, effort and motivation were due to the intervention.

You know, when *Coach 3* was away in XXXX, because I wanted to impress him when he got back....the effort did pay off, and when he was away I seemed to train hard every night and didn’t get tired and sometimes if I was tired, I’d end up coming, coming in and doing well (Athlete 3).

Summary of outcome: Athlete training behaviours. The results suggest that some athlete training behaviours improved between pre-test and post intervention. In particular, athlete motivation, seeking improvement, effort and coping with adversity seemed to be key

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behaviours which were mentioned by athletes and coaches as having increased, which mirror the significant increases and large effect sizes suggesting on the coach questionnaires.

Across the cases, some of the improvements in training were due to the intervention however some improvements could have been caused by the maturation of the athletes or other events, such as coaches going away for short periods of time.

Unintended Outcomes. Table 4 displays coach-reported unintended outcomes of the intervention, which illustrates the broader impact on the coaches and their professional activities. Importantly, all coaches' reported an increased awareness of the impact of what they said to their athletes. Coaches also reported being more supportive and tolerant of athletes and altering their understanding of their role as a coach to include the mental side of performance. These unintended supportive behaviours could have impacted on athletes' PS use, as research suggests that there is a direct relationship between supportive coaching behaviours and athletes use of positive self-talk (Zourbanos et al., 2011).

Other unintended outcomes included one coach (Coach 1) changing jobs from being a centre manager to take a full time coaching orientated role due to participating in the intervention. Three out of the four coaches mentioned disseminating the knowledge they had learnt about PS to other coaches. Some coaches were also using PS when they actively participated in sport themselves and sought other development opportunities after the intervention (See Table 4 for example quotes). Together, these findings highlight the possibility of a 'ripple effect' being created by the intervention, in terms of coaching roles, professional development and dissemination to other coaches.

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Table 4.

Coach Reported Unintended Outcomes

Themes	Example Quotations
Increased awareness of impact of coaching behaviour	"I think when I am discussing things with my either my mini-athletes or my athletes I am more aware of what I say and how it might affect them."
Changed perceptions regarding coaching role	"I could see that successful coaches were the ones who didn't spend any time at that point telling <i>their athletes</i> what to do but who just got <i>their athletes</i> into the right frame of mind to go out and give their best performance, and that again made me realise that, that is the single contribution I can make at a competition".
More supportive coaching	" I found it difficult, and it's probably a weakness in me, which is, has benefited from the programme is that I have become more tolerant as I had these meetings with PF. Because sometimes I got frustrated as to why athlete A or athlete C, you know couldn't do it, urm and then looking at what the PF was saying as part of these interventions, probably you has, has made me a better listener.
Coaches' effective personal use of PS	"Myself, well I mean, golf is a big favourite of mine and I definitely am much more positive and ...I've been able to better handicap, whether that's anything to do with the programme I don't know" "I went up and putted and said right 'this is going in' and by Jo it went in it."
Changed employment	"The programme was part of the reason for me leaving my job because it made me realise how much I enjoy coaching and this, this is what I want to do, this is who I am. I cheerfully spent six years thinking I was a manager, and actually I'm a rubbish manager and I like to think I'm an OK coach and I really enjoy it...it was very instrumental in making me leave.
Educating other coaches about PS	" It's given me the ability for when I run coach ed courses now (which I do for the governing body), to be able to put an add on, or another couple of powerpoint presentations into the slides, to look at psychological sort of issues that affect <i>the athletes</i> "
Motivated to engage in education	"When my business gets better, looking at doing a distance learning course and trying to find out more".

Table 5 displays athlete-reported unintended outcomes of the intervention which illustrates the impact of questionnaire completion and the breadth of the intervention impact. All athletes, (except Athlete 4) suggested that completing the TOPS and CEPS, made them more aware of their PS use. Athlete 2b also suggested that completing the questionnaires was a catalyst to asking Coach 2 more about PS and using more PS which had not been developed

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by the coaches during the intervention. Finally, one athlete (Athlete 3) suggested that he would now include psychological instructions if he was coaching, a ripple effect illustrating how athletic experiences can be used to inform future coaching (Erickson *et al.*, 2007).

Table 5.

Athlete Reported Unintended Outcomes

Themes	Example Quotations
Intention to coach PS	"If I was coaching someone I would tell someone to use it, like the little kids I would say 'right don't, be scared of it, it's just a little bar with rubber around it' it's nothing you know. If I was coaching, that type of thing I would. Oh I'd obviously share with, in the near future with people yeah."
Questionnaire completion increasing self-awareness	<p>"not aware (<i>before</i>). I wasn't. I knew that I did it but I didn't think I did it, if that's makes sense. If somebody asked me, do you use mental skills, I'd go no, but then thinking about it. I actually do."</p> <p>" I think the, the questions made me sit and think, where, where as if I hadn't have seen it in black and white I wouldn't have sat there thinking 'ahh well that's a, yeah that makes sense, yeah'.</p>
Increasing use of other psychological skills not included in the intervention due to questionnaire completion.	<p>"The goal setting questions (<i>on the TOPS and CEPS questionnaires</i>) has helped our training loads, like we. We wouldn't be as good as what we are now, if we hadn't have had that, that 'alright yeah goals, sounds like a good idea."</p> <p>"So after we'd done the questionnaires we kind of said to <i>the coach</i>. "Well we kind of haven't really done any of this so can we, kind of do stuff? ", so we went into the studios and set some time aside and, so it just kind of pushed things on from there."</p>

Intervention Process

The *hypothesised active ingredients* of need support (autonomy, interpersonal involvement and structure) and coach confidence to teach were reported. The *emergent active ingredients* reported were: (a) the context that the coaches and athletes were working in, (b) coach understanding of the intervention and PS, (c) coach awareness of discrepancies in their coaching, (d) coach attitudes towards coaching PS, (e) coach motivation and intentions to

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coach PS, and (f) coach procedural knowledge of how to teach PS. In the following sections the data of each active ingredient will be presented, followed by a summary of each case.

Need support.

Coach-rated need support. We ran a one sample *t*-test to assess whether need support ratings on a 0-4 scale were significantly higher than the mid-point of the scale which was two. The *t*-test revealed that coach ratings of needs support were significantly higher than two with a large effect size ($t(8) = 14.76, p < .001, d = 11.45$) indicating that need support ratings were high.

Observed need support. For the two sessions that were observed, the mean ratings of observed needs support on a 1-7 scale were 6.09 ($SD = 0.54$) and respectively 5.5 ($SD = 0.83$), also suggesting that need support was provided during the intervention.

Needs support: Interview reports. The interview reports showed that all coaches experienced high levels of needs support during the intervention. All four coaches reported that they had experienced autonomy as ability to choose the content of the programme. “I felt like I had, I had the ability to choose, which way I was gonna go with things and, and that the PF then just made sure that I had the information to go with those decisions (Coach 2).” Also all of the coaches reported perceiving interpersonal involvement from the PF, provided by the genuine interest expressed by the PF.

The PF is great. I mean she, she is genuinely sort of a very, very enthusiastic person and that sort of, and that comes out you know. I mean it, it was a pleasure to have her around us and she was really interested. I think even to the point where she knew what I done in one competition, I don’t know she must have researched something on Wikipedia from half way through the last century (Coach 3).

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However, it is likely that Coach 2 experienced slightly lower interpersonal involvement than the other coaches as she suggested the PF was perhaps a little baffled by the sport she coached.

She was pleasantly interested but, you know, it's I know it's hard work everybody who comes to the *sport* always says that you know 'I know nothing about *this sport*'So yeah I'm kind of used to people being a bit baffled by what, what me and my athletes do. So it's kind of, hard for me to gauge. She did seem, warm and genuine which was really nice (Coach 2).

Coach 2 also intimated that perhaps the PF was stretched in meeting all her commitments, so perhaps limiting the perceived interpersonal involvement she received.

It must have been difficult to do all that travelling and getting to and I'm like, I don't have any complaints. I'd just say like maybe it was, it was difficult for the PF to find the time to be in all, you know, to do the meetings and so on (coach 2).

Conversely, Coach 1 may have experienced the most interpersonal involvement as she mentioned being provided with activities which were tailored to her sport and in line with her preferred way of learning. This individualised approach also appeared to impact on the coach's perceptions of interpersonal involvement, as she recognised the extra effort being contributed by the PF.

The relaxation information she (the PF) provided me with was, was great. She specifically tried to tailor it to my sport, which was really, really good. She didn't need to, but it was lovely that she'd put, you know the effort into it (Coach 1).

Finally, the structure provided throughout the intervention seemed to vary between coaches. Coach 1 reported experiencing high levels of structure, in the form of clear explanations and positive feedback. "When she did the initial observation but also when we did the relaxation

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session, for the adult and the young *athletes*. That feedback was really good because it gave me the confidence to go on and try it again (Coach 1).”

The other coaches also talked about being provided with some structure in the form of clear explanations of PS (Coach 3), concrete tasks to assist understanding of PS (Coach 4) and feedback when observed coaching of PS (Coach 2).

I suddenly had a realisation that it was. It was good because it was concrete (*a PS golf task*), it was something that I was involved in and not the athlete and it suddenly brought it home to me that it's (*self-talk*) a powerful tool (Coach 4).

However, comments from the coaches suggested there were areas where structure could have been improved. Two coaches (Coach 2 and 3), suggested that they would have liked to have received more feedback from the PF³. When Coach 3 was asked about the PF's provision of useful feedback regarding his coaching of psychological skills, he said;

It wasn't something that, I think that, there was much, there wasn't a great deal of feedback on..... I think that would be an area of the programme I would definitely sort of endorse. So at the, at the end of, of the programme, to sit down probably with the PF or somebody that has all the, the data (*from the questionnaires*; Coach 3).

One coach also suggested that he/she would have benefitted from more assistance to establish a logical structure when planning the coaching of PS during stage five (see Table 2) of the intervention.

To figure out how to structure the sessions. I think that might be something that, not every coach might be able to do, to find a logical thread, or maybe not every coach would want to do it, to find a thread going through the session that they're gonna deliver. But I found that, I believed in what I was delivering much more when I knew

³ Coach 3 did not participate stage six of the intervention (see Table 2) despite being offered the opportunity to participate in it.

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there was some logical steps going through it to an end...end goal. And that I felt like my athletes would believe in the session more if they could see. “ah yeah that why we did that, because it helps us to get to there, to get to there.” I think that might be something that she might be able to facilitate a little bit more (Coach 2).

Structure could have also been improved as one coach was initially unclear about what was involved in the intervention.

The PF first came down I think it was just, she simply observed and there wasn't a lot of interaction between us because and there wasn't a lot of interaction myself ...I don't think there was any, a great deal of interaction about what, what was to follow...I didn't actually know a lot about you know where we were going (Coach 2).

Finally, Coach 1 suggested that she initiated some structure by setting goals for her participation on the intervention. “ She probably didn't assist me a lot with that because I'm very goal orientated and output orientated as a person anyway, so I was quite alright with setting my own goals (Coach 1).” However, none of the coaches were assisted to set goals during the intervention.

Summary: Need Support. The questionnaire and observational data show that intervention was need supportive for all the coaches. All coaches reported experiences of interpersonal involvement as the PF was genuine and enthusiastic, with only Coach 2 suggesting some possible areas of improvement during the interviews. All coaches also reported experiencing autonomy within the intervention. Structure was present during the intervention, however it seemed that the provision of structure could have been increased by assisting coaches to structure their teaching of PS, providing more feedback and setting out the expectations of the intervention more clearly at the beginning. Overall, it seems that Coach 1 experienced the most effective needs support, as the intervention was tailored to her and she set her own goals for the programme.

Coach confidence to teach PS.

Coach confidence to teach psychological skills questionnaire (CCTPS). A one way repeated measures ANOVA was conducted on the CCTPS data (pre-test/mid test/post-test). Mauchly's test indicated that the assumption of sphericity had been violated ($X^2(2) = 0.12, p < .01$); therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity. The results show that coach confidence significantly increased over the intervention, pre-test confidence $M = 5.13$ ($SD = .83$), mid-test confidence $M = 6.91$, ($SD = .58$) and post-test confidence $M = 7.48$, ($SD = .65$) with a moderate and meaningful effect size, $F(1, 7.4) = 6.34, p = 0.035, \eta^2 = .624$;. Follow up Tukey HSD tests revealed that significant differences existed between pre-test and post-test, and between pre-test and mid-test, but not between mid-test and post-test.

Coach confidence to teach PS: Interview reports. All of the coaches suggested they had low to medium confidence in their ability to teach PS at the beginning of the programme. The coaches had initial concerns about coaching PS such as; getting coaching PS wrong, whether athletes would understand their explanations about PS and whether coaching PS would negatively affect the athletes.

I think for me, it was just to get a bit more of an idea of how to go about starting with psychological skills with my athletes, becauseI know a bit, and I sometimes, people say a little bit of knowledge is dangerous. And of course you don't want to do anything that's going to damage your athletes in any way by getting something a bit wrong in what you tell them, so in that respect I was very tentative about, the idea of broaching PS in any depth (Coach 2).

Furthermore, three coaches (Coach 1, Coach 3 and Coach 4) suggested they were nervous about delivering PS to athletes for the first time, even whilst being supported and observed by PF during stage 6 of the intervention (see Table 2).

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(at the planning phase) I was thinking, holy cow, how am I actually gonna deliver anything to my athletes. Again it's that thing of, the nerves or the anxieties' of your own lack of confidence. It, it was becoming very obvious, at, at some point I was gonna have to do something with my athletes, and I was thinking, I, I still don't know whether I'm ready for this, so, so that, at that stage I was still, feeling quite.... like I'd got some good information and I had confidence in the PF. But I, at that stage I was still wishing, can't I, can't I just ask the PF to do this? (Coach 2).

However, all of the coaches suggested that their confidence to teach PS increased throughout the intervention. The coaches highlighted some elements of the programme which had increased their confidence, such as being given information which improved their understanding and knowledge of PS.

Especially with the self-imagery and the self- talk where there's a direct sort of how can I say, personal relationship between me and a lot of my sort of athletes. It gives me that ability to be able to just have a bit more knowledge to be able to say right, 'when you go out on the platform, you know, switch the lights off to the world and just focus on what you are doing on the platform', you know. It, it's just given me that, that bit more sort of confidence, yeah (Coach 3).

The long term process of the intervention gave some coaches confidence as there were multiple meetings, allowing for regular updates and reviews. Two coaches (Coach 2 and Coach 4) also mentioned that their confidence to teach PS increased by creating a plan of how to coach PS and doing sufficient preparation.

I've not done a lot of public speaking and it, we did have a chat you know. I had to actually go home and think about 'ok what I'm going to say, what am I actually going to say, I can't just come out with all this blurb, blurb, blur. And So I did, I, I studied what I wanted to say, in terms of, how I thought that it was important (Coach 4).

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However, coaches did say that to increase their confidence to coach PS at the planning stage, doing a dry run with the PF before presenting to the athletes may have helped. Yet as intended by the intervention design, having tangible positive experiences of using or teaching PS during the intervention increased the coaches' confidence to coach PS.

It increased slightly after the, the sessions where the PF was giving me the information and it increased a lot after the sessions where I'd actually tried to deliver it myself. I think by the end I was sort of a seven or an eight (*out of ten*). Feeling much more confident about these things (Coach 1).

"Having gone through what we did with the PF, it kind of made me feel a little bit more confident to find ways to introduce things to the *athletes* (Coach 2)." Finally, the coaches talked about gaining confidence to teach PS from mastery experiences (Bandura, 1997) by witnessing the positive effects of coaching PS on athletes' performances.

I believe in it now, I think that's helped to actually. I think that was an important thing you know, I've seen it work now.... So, that, that gives you the belief and when you have the belief, you obviously you take it onboard (Coach 4).

Summary: Coach confidence to teach PS. Coaches reported having low confidence to coach PS at the beginning of the programme and all coaches' confidence to coach PS seemed to increase as a result of the intervention. The interviews highlighted that the long term nature of the intervention assisted to build coaches confidence to teach PS. The coaches had felt anxious about delivering the coaching PS for the first time, however coach confidence seemed to increase following the planning of a session and the mastery experiences of delivering PS successfully. Coach 3 and 4 did not take part in observed delivery of PS, and potentially similar concerns to Coach 1 and 2 (i.e., saying the wrong thing or athletes laughing at them) could have been a barrier to their engagement in this stage of the intervention.

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Emergent active ingredients.

Environmental context. Coaches' previous experiences of PS prior to the intervention varied and seemed to influence the coaching PS they engaged in. Coach 2 had previous experience of PS education when she was an athlete and then studied a sport science degree which included the study of PS. Coach 4 had had some PS education as part of his coaching qualification, however Coach 1 and 3 had had no formal learning experiences of PS. Coach 2's additional knowledge and experience regarding PS seemed to influence her attitudes and actual coaching of PS.

I remembered when I was an athlete, I started out with very, very simple exercises, like imagining a coloured circle and a white background and trying to change the colours. And I thought, I really didn't want to go into all of that stuff with my athletes 'cos it seemed a bit dry, so I kind of hoped skipping over those things wouldn't actually be to the detriment of, you know of introducing those skills.

The coaches also varied in terms of their athletic experience, with Coach 2 and Coach 3 having international level competitive experience as athletes when compared to Coach 1 and Coach 4, who only had recreational athlete experience as an athlete. The high level athletic experience seemed to assist Coach 3, as he was able to understand PS with reference to his own athletic experience. Athletic experience seemed to assist Coach 2 and the effectiveness of her coaching of PS as the athletes "listen to the suggestions of an Olympian (Athlete 2b)."

Interestingly whether coaches were paid for their coaching or volunteering did not seem to affect the intervention process or outcomes. However, Coach 2 mentioned being paid on an hourly basis by private individual clients was a barrier to coaching PS.

You know, different probably from most sports is that we're professional coaches we're paid, so the parents are sitting there looking at the clock and they don't like to

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see you standing there talking for too long they want to see their kids *training* so you're trying to do all of these things under quite a lot of pressure (Coach 2).

Time of season and external events occurring during the intervention and coaching PS affected the efficacy of the intervention. Coach 2 and her Athletes 2a and 2b mentioned that, at certain times in the season, coaching PS had stopped due to other more pressing goals, such as the need to design a routine. Coach 3 also mentioned that he was extremely busy when participating in the intervention, which affected his level of involvement in the study.

There's just so much good that I took out (of the intervention), and I think that.

Maybe like I said it was building up to *the games* where, you know you're getting phone calls as to why I've missed this today and what should I be doing tomorrow, I think there was a lot of that so there was a zillion and one things was going on in that last three months before, before *the games* (Coach 3).

The venue where the intervention sessions took place seemed to influence coach experience of the intervention. In particular, Coach 3 suggested that he would have liked to meet in a quiet, neutral environment. He found meeting at the University daunting and meetings at the sports venue were interrupted by athletes.

I think if there was any sort of distraction it was the fact that PF would be in my gym and no, no problems with the PF but, they'd be knocking on the door asking what to do next, so, that was slightly sort of, taking my mind off in two sort of different trains of thoughts, ha that was difficult for me, yeah (Coach 3).

In terms of context of the athletes, all the athletes interviewed trained with their coach at least three times a week and were competing at national or international level. Therefore, these results may not be generalisable to other athletes who receive less coaching time or compete at a lower level.

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Another important contextual element is the coach-athlete relationship. All of the athletes interviewed suggested that they had a good relationship with their coach.

She'll always make time, if you, you're concerned about something, you know even if she has to dash off somewhere she will make time, urm to listen to you if you have any worries. Where some instructors, you, you know once you get off the *training equipment*, that's it, bye (Athlete 1).

Indeed previous research indicates that the quality of coach-athlete relationships can influence athlete development (Jowett & Cockerill, 2003), therefore the positive athlete outcomes created by the coaching of PS in these case studies are likely to have been assisted by good coach-athlete relationships. Hence the results from this study may not be generalised to coaches and athletes who have poor or distant relationships. Finally, regarding athletes' context, Coach 1 was the only coach who worked with athletes with physical disabilities, which she suggested presented additional challenges to the questionnaire completion and the coaching of relaxation strategies.

One of the deep relaxation techniques she taught me, didn't work for people with a physical disability. Because it involved them contracting and relaxing their muscles systematically and some of them with abnormal muscle spasm, that actually had a negative effect, which is not something I suppose, not many people have used these strategies with disabled athletes, so it was really interesting that, that came up and immediately we said, right shelve that one, not going to use that (Coach 1).

In summary, the contextual factors which seemed to influence the intervention were; the participants' previous experience of PS, the setting where the intervention sessions took place, athlete disabilities, the time demands on the coach and athletes and being paid to coach on an hourly basis.

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Coach understanding. The nature of the coaches' understanding of both the intervention process and the nature of PS seemed to influence the coaching of PS that occurred. Most coaches reported that they had been given clear explanations regarding the intervention process and resulting in a clear understanding of what would take place at each stage of the intervention. However, Coach 4 suggested he was not initially clear about the purpose of the intervention and only once he had participated in the use of PS himself did he gain clarity and then he "took the coaching PS onboard (Coach 4)."

After the programme, the coaches' understanding of the nature of PS differed across cases. Coaches 1 and 2 saw PS as mental strategies which assist athletic performance "It's giving the athlete mental strategies to help them perform to the best of their ability (Coach 1)." which was aligned to the PF's definition. Coach 3 and 4's understanding of PS was more general and didn't seem to involve techniques or strategies "the ability to deal with holistic competition environment (Coach 3)" and "the mental state of things and the mental powers that the athletes are given, it's a matter of...of being confidence really (Coach 4)". This difference in understanding could have influenced the differences between Coach 1 and Coach 2, who overtly taught their athletes to use mental strategies in a structured way and Coach 3 and Coach 4, who coached PS using TC, via altering their instructions and encouragement without providing explanations of coaching PS.

Awareness of discrepancies. Another facilitating factor to coach behaviour change seemed to be the awareness of discrepancies between the coaches' current coaching and coaching which includes effective coaching of PS. Coaches 1 and 2 suggested at the beginning of the intervention they were aware of the gaps in their knowledge and their coaching regarding PS.

A lot of the time I knew the skills and the things that were listed and found myself saying quite often, "no I don't ask my athletes to do that" , or very rarely ask them to

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do that and the reason I was having to answer those questions in that way was because

I didn't know how to tell them how to do those things (Coach 2).

However, Coach 3 did not seem to perceive a particular discrepancy regarding the inclusion of PS in his coaching; instead he suggested that the intervention reaffirmed both his athletic experiences and how he was coaching already. The lack of any perceived discrepancies could have influenced Coach 3 to implement fewer changes to his coaching than Coach 1 and 2.

I wouldn't say that, as you know, as a day I'm in the gym, 6 days a week, maybe twice a day sometimes so, I won't say that it's become you know, a, an integral part of every session. What it's done....it's actually give me, a bit more confidence in probably what I was doing already, was, was almost there but with the PF she's give me just,, a few more sort of component parts that urm that I can use (Coach 3).

Coach 4 suggested that by learning about positive self-talk and its influence on performance, he became aware of discrepancies in his coaching as he often gave negatively worded instructions to his athletes and he subsequently altered his instructions to use instructions and cue words with a positive focus.

In my coaching the language I use, it has to be more optimistic and well I'm always fairly optimistic myself but in terms of, I've learnt that actually, most of the sayings I would say, would be a negative saying (Coach 4).

Coach attitudes and outcome expectancies of coaching PS. A key facilitating factor regarding whether the coaching of PS took place was coach attitudes towards coaching PS; both the perceived need to coach PS and the expected outcome of coaching PS. In some cases, the coaches' perceived need to coach PS depended on the characteristics of the athletes they were coaching. Some coaches (Coaches 3 and 4) suggested that they were more likely to coach PS to address mental weaknesses in athletes and made less effort to speak about PS to athletes who they considered to be 'mentally tough'. "Whenever a championship comes

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along, she. I don't have to actually say a lot. She, she actually competes brilliantly (Coach 4)". Indeed, the coaches' perceptions of athletes' needs and goals influenced whether coaches prioritised the coaching of PS. For example, Coach 2 and Athlete 2a and 2b suggested that coaching and practicing of PS "got pushed to the wayside due to other more pressing goals (coach 2)." Only one coach (Coach 1) recognised the need to keep reinforcing the coaching of PS and the importance of athletes practicing using PS regularly:

"Using it, and to, made me realise the importance of athletes practicing it. So they, it wasn't enough just to do it at a competition. I had to actually be using it in every session, so that they became skilled at it. (coach 1)"

The other area of coach attitudes which seemed influential were the outcomes coaches expected to result from coaching PS. At the beginning of the programme, all coaches had some concerns about the negative outcomes of coaching PS which seemed to prohibit the coaching of PS.

I was worried that I was going to, to have some resistance particularly from *athlete X* just because I expect that (coach laughs). Maybe, Maybe it's my own bias. But I think it was, received quite well by both of them which surprised me a little bit (Coach 2). Crucially, influential outcome expectations were created when coaches experienced using PS themselves. One coach's attitude towards PS became more positive as a result of him using PS successfully when he played golf. Conversely, one of the coaches wrote an imagery script and became emotional, therefore did not introduce script writing to athletes.

I chose my sort of, my *international* experience myself 'cos I had never done a script before an event to help me through an event, I, I could only do this, sort of retrospectively. But as I was reading the script back with the PF, I just, I just filled up with tears because it was so emotional 'cos it just took me right back to that moment; it was really surprising and I thought "ooh I can't do that to the athletes! (Coach 2)"

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Once the coaches (Coaches 1, 3 and 4) had witnessed the positive effects of coaching PS to their athletes then they developed more positive attitudes about coaching PS. These positive outcome-expectancies seemed to reinforce their intentions to continue coach PS. “you know when I realised how powerful the self-talk could be and my motivation really kicked in then and this wasn’t something that people said was good, this was really good (Coach 1).

However, following the programme some coaches retained some negative attitudes towards coaching PS. Two coaches mentioned being concerned about going into too much detail regarding PS, which they suggested could cause athletes to overthink or consciously process information (c.f Masters, 1992), which could disrupt their performance. These concerns could have been instrumental in Coach 3 coaching PS in a more covert way using TC, rather than providing detailed explanations. “I think sometimes when you disseminate too much, to an athlete, it becomes a bit problematic, ‘cos you don’t want them to think too much when they are *on the field* (Coach 3)”

Intentions and motivation to coach PS. The coaches’ understanding, attitudes and experiences regarding the coaching of PS seemed to influence their intentions and level of motivation to coach PS after the programme and therefore their behaviour. Three of the four coaches (Coach 1, Coach 3 and Coach 4) were motivated to continue coaching PS. The coaches’ motivation to coach PS seemed to be integrated, autonomous motivation as they saw coaching PS as part of their role and they enjoyed coaching PS to their athletes.

I’ve seen the results now even more so. So from now on I believe in it, and from now on I, I will try to use it more and more simply as I get more expertise in it. (Coach 4)

However, one coach (Coach 2) suggested that she was motivated to coach PS in subtle ways, however her motivation to coach PS “ had tailed off after her participation in the intervention”. The decreased motivation could have been a result of perceiving slightly lower need support than the other coaches, pressure to coach physical skills by paying clients and

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her concerns about the detrimental effects of coaching PS. Coach 2's reduced motivation to coach PS could also be linked to failing to see significant improvements in athletic performance as a result of her efforts. Indeed, she mentioned that it was difficult to seek feedback from her athletes about their use of PS.

In order to assist in maintaining motivation Coach 2 and Coach 3 suggested an additional workshop or challenge following the intervention could be helpful.

You know, or just an annual refresher, yeah, that type of thing, you know. So as, as part of coach ed, I think that you know whether it's, it's a 2 hour workshop or bi-annual workshop, I think that I would like to take part that (Coach 3).

Procedural knowledge. Finally, the coaches' range of procedural knowledge (knowing how to coach PS) for different situations seemed to influence the extent to which they continued to coach PS. Some of the coaches (Coaches 1 and 4) suggested that they could coach PS flexibly, whenever needed and with any athlete, even it was the first time they had coached them. Conversely, Coach 2 said that she was lacking procedural knowledge to flexibility to teach PS in different ways. This lack of flexibility could have been influential in the decline of Coach 2's motivation to engage in coaching PS.

Wanting to have, more than one way perhaps of delivering the same thing, so. I'd have to give it some thought, I'd have to get some books out and have a read, but yeah basically I'd want to be able to deliver it, in more than just one way. Cause I do find that as a coach, if you, if you say things the same way every time sometimes people just don't get it but if you explain exactly the same thing with different words or with a different metaphor, and suddenly there's a light bulb that comes on, somebody understands what it is you're getting at, so I think that's really important, rather than hammering them over the head with the same thing again and again (Coach 2).

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This sentiment is also supported by an athlete coached by Coach 2 (Athlete 2a), “Yeah it, it did when she was doing it a lot more. It, she’s kind of told us a lot about it now, so she doesn’t have to go over it as often so we just kind of do it ourselves.”

Case Summaries: Outcomes and Active ingredients

To summarise the outcomes of Case 1 (Coach 1 and Athlete 1), the coaching of PS increased and its positive impact on the athlete use of PS and athlete performance was clear. This coach continued to coach PS consistently with a wide variety of athletes and was witnessing the positive effects on athlete performance. There seems to be a number of positive active ingredients involved in this case. Coach 1 seemed to experience high levels of need support, and perhaps more interpersonal involvement (tailored information and effort from the PF) and structure (feedback and clear goals) than other coaches. At the beginning of the programme she had low confidence to teach PS, but she had a clear understanding of PS and was aware of discrepancies in her coaching of PS that she wanted to improve. Following stage six of the intervention, where she gained experience of coaching PS and was given feedback, her confidence improved. At this point she developed positive attitudes regarding the need to teach PS regularly and the expected positive outcomes by doing so. Coach 1 was therefore motivated to continue to coach PS and had sufficient breadth of procedural knowledge to do so with different athletes. More recent experiences of the positive outcomes coaching PS have increased her motivation further and she now sees the coaching of PS as part of her role as a coach.

Within Case 2 (Coach 2 and Athlete 2a and 2b), the coaching of PS increased as a result of the intervention and it had a positive impact on athletes’ understanding and use of PS, and their training behaviours. However, during the follow-up interviews both the athletes and coach suggested that the coaching of PS and athlete use of PS had not been maintained. There are a number of active ingredients which could have contributed to this pattern of

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behaviours. At the beginning of the programme this coach had a clear understanding of PS, she believed PS were important and became aware of discrepancies in her coaching regarding PS. This coach also had concerns and anxieties about coaching PS, which were somewhat reduced as a result of stage 5 and 6 of the intervention. Importantly, whilst Coach 2 perceived the programme to be need supportive, she would have liked to have received more structure, via more support to plan and trial the coaching of PS alongside more feedback from the PF. A potential lack of structure, and therefore lower perceived competence (cf. Markland & Tobin, 2010) could have caused the coach to be extrinsically motivated during the programme and as such stopped coaching PS when the intervention finished. This reduction in motivation also seemed to be linked to contextual factors (i.e., athlete injury and being paid per hour). Moreover, a lack of flexibility to introduce PS in different ways or with different athletes is likely to have influenced the decrease in coaching PS.

Within Case 3 (Coach 3 and Athlete 3), the coaching of PS seemed to increase in the form of TC but seemed to be brief and its impact on athletes was unclear. Indeed this coach did not have an understanding of PS as strategies and perceived little discrepancy between his coaching and coaching including PS. The coach also had concerns that PS could not help every athlete and speaking to athletes in too much detail about PS could have negative consequences for performance. These factors are likely to have prevented extensive changes regarding coaching PS from taking place. In addition, due to contextual factors (i.e., time of season) Coach 3 did not complete stage six of the intervention, to coach PS whilst being observed which could have improved his understanding of PS, his awareness of discrepancies and his attitudes towards PS.

Finally within Case 4 (Coach 4 and Athlete 4), the coach reported increasing his coaching of PS via TC which had a positive impact on some athletes' performances. Athlete 4 reported receiving some coaching of PS from Coach 4, but had not experienced any

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noticeable changes in his approach to PS following the intervention. This is likely to be because the coach considered Athlete 4 to be ‘mentally tough’ and not in need of PS, as opposed to other athletes he worked with that he perceived needed more help with PS. This coach reported only increasing his coaching of PS, once he made experienced the positive outcomes of PS for himself. This positive experience altered his understanding and attitudes towards PS and as such he became aware of discrepancies in his coaching. He then changed his coaching to incorporate PS.

The intervention model

The case summaries were compared using pattern analysis (Ragin, 2000) to establish the potential components of coach change, which were displayed in a flow-chart model (See Figure 1). Each active ingredient of the intervention model is discussed below along with proposed facilitation of each component during the subsequent intervention.

Intervention context. The first component of the model is the context that the coaches and athletes are performing in. As suggested by the MRC guidelines (Craig et al., 2008), effective complex interventions should be tailored to be contextually relevant (see Rutter, 2006 for an example in the social services domain). Specifically the following contextual factors could present barriers to the coaching of PS and so should be taken into account during intervention participation; the time of season, coach and athlete availability, suitable meeting locations, coach-athlete relationships, athlete disability and other demands on coaches and athletes.

Intervention facilitation. In the subsequent large-scale intervention in Chapter 4, it was decided that information would be obtained at the recruitment phase regarding the aforementioned contextual factors in order to plan and account for them appropriately. A neutral non-threatening setting away from athletes for meetings would also be established for each coach session. To maximise the chances of a facilitative context, some recruitment

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changes were proposed. It was decided that team sports (e.g., hockey, football) were not going to be included in the subsequent intervention, due to the larger group sizes reducing the opportunities for coaches to provide coaching PS. In addition, recruitment would focus on athletes who see their coaches on a regular basis.

Coach understanding. Following establishing a suitable context, coach understanding regarding PS was thought to be the initial step towards coach behaviour change, and coach progress was hindered without an understanding of PS. Indeed, coaches needed to accurately understand what PS are, in order to contemplate whether to change their coaching to include more PS. Indeed, a lack of understanding and knowledge about PS has been a commonly cited barrier to the coaching of PS (Gould, et al., 1999; Harwood, 2008). The current intervention model mirrors other behaviour change literature, such as The Precaution-Adoption Model (Weinstein, 1988) which considers acquiring understanding of the issue or subject in question to be the first stage of change. Coach understanding regarding PS seemed to be linked to the level of structure the coaches experienced during the intervention.

Intervention facilitation. In the subsequent intervention, we decided to ensure the provision of structure and that clear information regarding the nature of PS was to be given initially and the PF then checked for coach understanding PS (Michie et al., 2008).

Need support & coach need satisfaction. Need support and subsequent coach need satisfaction (particularly competence or confidence in teaching of PS) seemed to be an overarching facilitator of coach behaviour change in this intervention. It has been shown that the longitudinal delivery of the current intervention can facilitate coach perceptions of autonomy, interpersonal involvement and competence. This finding corresponds to SDT findings that need supportive environments increase a learner's motivation, need satisfaction and subsequent behaviour change (Edmunds et al., 2008; Markland & Tobin, 2010; Reeve et al., 2004). It also corresponds to previous suggestions within coach education research that a

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collaborative, supportive relationship between coach learner and coach educator is crucial (Vella et al., 2013) and that a coach's self-determination during education should be encouraged (Nash & Sproule, 2011). Given frequent coach concerns and low perceptions of competence to coach PS prior to intervention participation, the provision of structure and mastery experiences (Bandura, 1997) should be a particular priority in the full-scale intervention.

Intervention facilitation. Initially, as previously discussed structure was increased via clearer explanation with supporting worksheets regarding what PS. Secondly, structure was provided in the form of specific goal setting at the end of Session 2 (as carried out in Vella et al., 2013), so that each coach was clear and motivated regarding what they intended to achieve from participation on the intervention (Locke & Latham, 2005). Furthermore, increased feedback was provided to the coach throughout the intervention. As such a separate session was added to the intervention as a feedback and future planning session which was intended to increase coach perceptions of their competence (Michie et al., 2008).

The intervention was also be improved as coaches suggested, with more structured assistance to plan the coaching of PS in a logical order and being offered a 'dry run' to practice their first experience of coaching PS. Indeed, action planning and graded tasks, beginning with easy tasks can be effective in enhancing beliefs about one's capabilities regarding behaviour change (Michie et al., 2008). Given that all the coaches interviewed had concerns about coaching PS, it was considered important in the subsequent intervention to encourage coaches to discuss these concerns, for the PF to acknowledge the coaches' perspective and provide strategies and information to resolve them.

Awareness of self-discrepancies. A common theme arising within the coaching literature is the need to encourage coaches' self-awareness regarding their actual behaviour (e.g., Smith et al., 1995; Vella et al., 2013). Specifically, the current the cross-case analysis

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highlighted that once an understanding of PS had been gained, coach awareness of self-discrepancies between the coaches' current coaching and coaching which includes effective coaching of PS, were likely facilitators of coach behaviour change. Indeed, Higgins' (1987) Self-Discrepancy Theory suggests that discrepancies between actual and ideal behaviour can influence a participant's mood and motivate an individual to act to reduce a discrepancy. Furthermore behaviour change theorists discuss using the processes of raising consciousness and self-evaluation which can elicit discrepancies and initiate change (Prochaska, Johnson, & Lee, 1998).

Intervention facilitation. As used in the pilot intervention, a process of coach profiling (e.g., Butler & Hardy, 1992) was used in the next intervention to facilitate coaches to re-evaluate their coaches and increase awareness of discrepancies. However, for the subsequent intervention it was decided that the coaches were given more explicit assistance to identify when the coaching of PS does and does not occur, therefore self-discrepancies would become more apparent. This practice is closely aligned to Smith and Smoll's practice of providing a personal profile of each coach based on the observations of their coaching.

Beliefs surrounding PS. Coaches' beliefs towards coaching PS influenced their subsequent behaviour change. Coaches were influenced by whether they considered that coaching PS was needed, would be positively received by the athletes and would produce beneficial outcomes. Various theories of behaviour change propose that an individual's attitudes towards specific behaviour(s) are a central component of change. In particular, The Health Action Process Approach (Schwarzer, 2008) suggests that outcome expectations (e.g., improved performance) and risk perceptions (e.g., athletes laughing at coaches) are predictive of behaviour change intentions. Similarly, The Theory of Planned Behaviour (TPB; Ajzen, 1991) suggests that attitudes (i.e., an overall positive or negative evaluation of the behaviour) subjective norms (i.e., perceptions of social approval from important others,

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athletes and parents) and perceived control (i.e., the perceived ability to carry out the coaching of PS) contribute to behaviour change intentions (Symons Downs & Hausenblas, 2005). Therefore, coach beliefs regarding coaching PS were included in the intervention model and were thought to impact on coach intentions to coach PS. Interestingly, as the current intervention model describes, other research has supported the combined tenets of SDT (Ryan & Deci, 1985) and TPB (Ajzen, 1991) being predictive of behaviour change (Hagger et al., 2003, Hamilton, Cox, & White, 2012). A combined approach, such as the one proposed by the Trans-Contextual Model (TCM: Hagger et al., 2003) uses SDT to explain how the general environment impacts on behavioural tendencies in that context (e.g., autonomy support leading to need satisfaction and subsequent motivational regulations). Then an individual's motivational regulations influence specific beliefs and attitudes and TPB (Ajzen, 1991) can help to explain the specific decision making about behaviour change at the situational level (e.g., the specific beliefs which lead to intentions). Based on the results of this study, the current intervention process of coach behaviour change is thought to occur via a similar fashion to that proposed by TCM.

Intervention facilitation. Coach beliefs were specifically targeted during subsequent interventions by assisting coaches to identify their athletes' needs and by making the information regarding positive outcome contingencies of PS more explicit and persuasive (Michie et al., 2008). Importantly, the next intervention facilitating coaches' own practice of PS was to be a more carefully structured process which is relevant to the coach and more likely to be a positive experience (Cassidy, Jones & Potrac, 2004; Gould et al., 1999). Also in the subsequent intervention if coaches had negative attitudes towards coaching PS, motivational interviewing principles such as 'rolling with resistance' and eliciting dissonance between different values (e.g., mental state is very influential on athlete performance versus

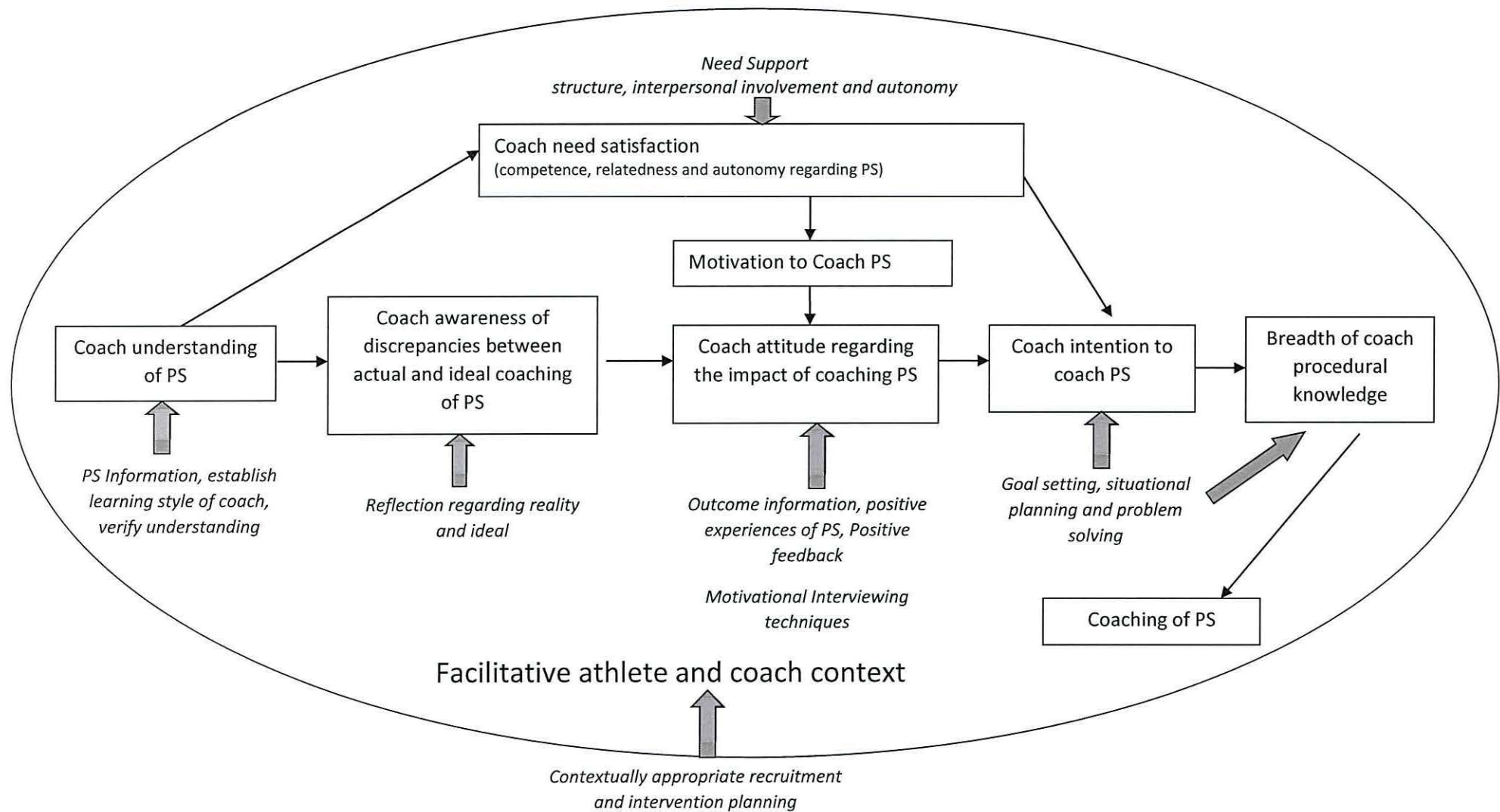


Figure 1. Coaching of PS intervention model depicting the active ingredients involved in coach behaviour change and planned delivery components.

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working on athletes mental state is not valuable) were to be adopted as a non-judgemental approach to clarifying and enhancing any positive attitudes (Miller & Rollnick, 2002).

Intention to coach PS. Once coaches have sufficient autonomous motivation and positive beliefs about the coaching of PS, the extent to which coaches intend to coach PS is thought to influence coach behaviour change. A coaches' strength of intention, is an indication of how much time and effort they would exert to perform the behaviour (Ajzen, 1991, p.181). Furthermore, strong intentions have been reliably observed to be realised more often than weak intentions (Ajzen, 1999; Armitage & Conner, 2001).

Coach procedural knowledge. Despite the importance of intentions, intent to engage in behaviours is not always translated into behaviour change, commonly referred to "intention-behaviour" gap (e.g., Sheeran, 2002). However, in the current study, when coaches intended to coach PS and had sufficient procedural knowledge of how to deliver PS this initiated the coaching of PS. Furthermore, when they knew a number of ways to deliver PS at different times or to different athletes they seemed to sustain and continue developing their coaching of PS. This finding aligns with suggestions that coaches have a strong preference practical skills (Vargas-Tonsing, 2007) which are open and can be used flexibly rather than being taught a single 'right way of coaching (Nelson et al., 2006; Vella et al., 2013). Furthermore, examinations of the intention-behaviour gap have suggested that there is a motivational phase where an intention is formed which is followed regulatory phase where a range of strategies are implemented to ensure an intention is realised (Gollwitzer, 1999). An effective regulatory strategy which can clarify procedural knowledge involves making detailed plans to conduct the intended behaviour (Michie et al., 2008; Schwarzer, 2008).

Intervention facilitation. Therefore, in the subsequent intervention coaches were assisted to make procedural knowledge explicit (i.e., when, where, how to conduct coaching

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PS and overcome difficulties) to enhance accessibility of intentions and bridge the intention-behaviour gap. This planning process was more extensive than in the previous intervention, taking place before the coaching of PS was observed and at the end of the intervention. During the final session of the intervention coaches were facilitated to plan for new and alternative coaching PS situations to extend their breadth of procedural knowledge thus facilitating the maintenance of the coaching of PS. Also by the practitioners being need supportive throughout the intervention, coaches will be empowered to draw on their own experiences and so procedural knowledge to context appropriate (Côté, 2006).

Summary of chapter findings

To summarise the **outcomes** of the current study, the intervention the increased the coaching of PS, although in some cases the increased coaching of PS was short-term. Two types of coaching PS emerged, as targeted cueing and overt coaching PS, highlighting the need for a broader measure of coaching PS. Also the intervention increased some, but not all athletes' use of PS, however the intervention impacted more conclusively on athlete awareness of PS use. Athlete training behaviours improved over the course of the intervention however the intervention was not established as the cause of such improvements. Multiple unintended outcomes were evident for coaches including; being more supportive of their athletes, changes of employment to do more coaching, dissemination of PS information to other coaches and coaches increasing their personal use of PS. Furthermore, unintended outcomes for athletes were elicited by the questionnaire completion.

The study results confirmed that the **intervention process** was need supportive and coaches' confidence to coach PS was increased by participating in the intervention. Furthermore, the levels of need support experienced by each coach seemed to be related to the extent to which they initiated and continued to coach PS. The results highlighted the need for improvements in the provision of structure in the subsequent intervention. From the

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current investigation emergent *active ingredients* influencing the coaching of PS were identified and mapped out in an intervention model. The model included coach understanding of PS, coach need satisfaction, coach self-discrepancies regarding the coaching of PS, coach beliefs regarding PS, coach intentions to coach PS and coaches procedural knowledge of coaching PS. This model was created to guide the specific delivery strategies to be implemented in the large-scale intervention, to enhance the likelihood of coach behaviour change regarding PS. Alongside the creation of the intervention model, the results of the current study led to the identification of multiple improvements to data collection procedures and measurement.

Evaluation limitations and improvements

The evaluation of the present intervention leads to a number of limitations affecting the conclusions which can be drawn. Based on these limitations a number of possible improvements to the measurements used and the data collection procedures have been identified for the next intervention (see Chapter 4).

Firstly, the results derived from the qualitative interviews were limited. Only a sample of the coaches and athletes were interviewed and the interviews were conducted at a single time point following the intervention, which relied on retrospective recall of experiences. It would have been advantageous to have interviewed all of the coaches and athletes throughout the intervention to obtain complete data during current experiences. However, given the limited resources of the research project and the time commitment already required of intervention participants, this was not possible.

The study was also limited by data collection processes and large athlete attrition which could be improved by amending the data collection process. During the current study, the data collection was poorly managed. Following PF distribution of questionnaires, the coaches collected them and returned them once completed. Allowing athletes to complete

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questionnaire in their own time meant high levels of attrition and despite clear explanations and anti-social desirability instructions, this process of data collection may have biased participants' responses. Furthermore, coach and athlete attrition is likely to have biased the results produced from this sample, as only the most motivated coaches and athletes are likely to have remained in the study. Therefore, any conclusions drawn from these data should remain conservative.

In order to improve the quantity and quality of data collected in the subsequent study, it was decided that the PF was to fully manage the data collection process. The PF would provide information about forthcoming data collection sessions to participating athletes (and their parents if under 18) in advance. All participating athletes would be reminded to attend specific PF run data collection sessions, where all questionnaires would be completed in situ. Any absent athletes would be contacted and followed up. In the same vein, the coach reports of need support are likely to be affected by social desirability issues, particularly as the need support questionnaires were administered and collected by the PF. Therefore, in the next study in Chapter 4, it would be beneficial to make the questionnaires confidential to any programme deliverers. Another data collection change was based on coaches' suggestions that the questionnaires were difficult for athletes under 14 years old to complete. The younger athletes found the questionnaires too long and difficult to understand, which is understandable given that TOPS2 was validated with athletes with a mean age of 17.25 (Hardy et al., 2010) and TABQ with a mean age of 23.00 (Oliver, 2009). It was therefore decided that the subsequent intervention would only test athletes aged 14 years old and above.

As well as the data collection procedures, some of the intervention questionnaires needed to be altered to be more appropriate. The qualitative interviews revealed two different types of coach encouragement of PS; TC coaching of PS and overt coaching of PS and the

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overt coaching of PS seemed to have more positive outcomes for athletes. However, CEPS did not differentiate between different types of coaching PS behaviour. Therefore it was decided to replace the CEPS with a more relevant measure of coaching PS to fully capture the coaching PS (see chapter 3 for details of validation).

With regards to other questionnaires used, the TOPS questionnaire produced inconclusive results. Athletes suggested that before the intervention they were not fully aware of the extent of their PS use and following the intervention their awareness of PS increased. Given that athlete awareness is an important outcome of the intervention which could have influenced the accuracy of athlete reports on other PS measures, it was decided to measure athlete awareness of PS use in the subsequent intervention. Furthermore, some of the athletes' increased awareness of PS was facilitated by completing the PS questionnaires. Therefore, if the intervention was re-delivered, the role of questionnaires in the creation of positive outcomes is an important consideration. Questionnaire completion also increased athletes' and coaches' interest in PS not covered on the programme. This broadening interest in PS is a positive outcome but creates a potential issue with statistically comparing developed skills to non-developed skills. Given this issue, in subsequent intervention studies, a control group was implemented.

Finally with regards to measurement, as suggested by the MRC guidelines (Craig et al., 2008) coaches' experiences of the intervention process as described in model (see Figure 1) should be evaluated. This assists to understand *why* the intervention did or did not work for different coaches. Therefore measurements of; coach need satisfaction, coach understanding, coach discrepancies, coach attitudes, and coach intention to coach PS need to be obtained. In Chapter 4, ways of measuring changes in these active ingredients are discussed in detail.

Implications

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This study provides an example of intervention development as suggested by the MRC guidelines (Craig, et al., 2008), presenting a rigorous approach to complex intervention research. This study used a mixed methods approach from both athlete and coach reports to strengthen findings via triangulation (Jick, 1979) and to combine findings based on differing philosophical assumptions. Alongside mixed methods approach to analysis, data from both athletes and coaches were obtained to avoid an over-reliance on self-reported data. As such this research study provides an initial step towards improving the rigour of coach interventions, by providing an example of intervention development.

The coaching PS intervention was shown to be effective and show that a MI supportive mentoring intervention could be more effective than past coach PS interventions (Callow et al., 2010; Harwood, 2008; Edwards et al., 2012). Furthermore, this study highlighted the need for a valid measure of coaching of PS, which included a range of coaching behaviours. Therefore, new measures of coaching of PS were developed and validated in the next chapter. Indeed, such will also be of use to other researchers and as such, will improve the quality of coaching PS research.

Furthermore, the intervention was theory-driven and SDT (Ryan & Deci, 2002) was confirmed as a relevant theory to underpin a coaching PS intervention. Alongside SDT, other active ingredients were identified and included in the intervention model. The intervention model created within this development phase will guide the subsequent intervention to increase the likelihood of creating a practically effective. Therefore, it is hoped that this research will assist other researchers to develop and pilot interventions more extensively and the intervention model once tested, will inform other coach behaviour change programmes.

Chapter 3

The development of coaching psychological skill inventories: Structural, concurrent and predictive validity

Abstract

Chapter Three

This chapter reports three studies involving the development and validation of two coaching PS questionnaires. Study 2 established the nature of coaching PS via qualitative analysis of coach and athlete interviews (interviews conducted in Chapter 2). The results suggested that there were four types of fundamental coaching of PS behaviours (observation, targeted cueing, instructing and reinforcement) and there were two types of coaching PS behaviour indicating the quality of coaching PS (seeking athlete involvement and providing explanations).

Study 3 involved the development of items for two questionnaires; the Coaching of Psychological Skills – Fundamental (CPS-F), and the Need Supportive Coaching of PS (CPS-NS). Initially, 21 items were developed measuring the frequency of fundamental components of coaching PS for the CPS-F and 14 items for measuring the quality of coaching PS, the need supportive coaching of PS (CPS-NS). Following confirmatory factor analysis procedures of the completed questionnaires ($n = 471$) and subsequent item deletion, acceptable model fits were established. The data supported a 13 item 3-factor model for CPS-F which included coach observation of PS, targeted cueing of PS and coach encouragement of PS (a combination of instructing and reinforcement). The 8 item CPS-NS scale (providing explanations and seeking athlete involvement) was found to have a single factor structure (CPS-NS). Initially evidence of discriminant validity was provided as the measures differentiated between athlete performances.

Finally, Study 4 investigated the concurrent and predictive validity of the questionnaires from a sample of the athletes ($n = 197$). Concurrent validity was established through significant correlations between subscales of the CPS-F and CPS-NS a measure of

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coaching mental preparation (Coaching Behavior Scale for Sport; CBS-S; Côté et al, 1999). Initial support for the predictive validity of the questionnaires was established as all subscales of the CPS-NS and CPS-F significantly correlated with measures of athletes' awareness of PS. This set of studies is the first to create a model of coaching PS and develop inventories whose scores are a reliable and valid measure of coaching PS.

Chapter 3

The focus of the present research was to develop and deliver an effective coaching PS intervention. A key requirement of a rigorous coach intervention is the accurate and valid measurement of coach behaviour change (Langan et al., 2013). Therefore in the context of the PhD, in order to implement a rigorous coaching PS intervention a valid measure of coaching PS was required. Over the past 30 years, several methods of measuring coaching PS have been developed (e.g., Hall & Rodgers, 1989; Jedlic et al., 2007). However due to a lack of theory informed development and statistical validation the quality and utility of coaching PS measures was not deemed appropriate for the current context. Therefore, within Study 1, a new coaching PS measure (the Coach Encouragement of Psychological Skills Questionnaire: CEPS) was devised and piloted. Unfortunately the pilot evaluation revealed that the CEPS was overly simplistic. Indeed, the CEPS only assessed athlete perceptions of how often coaches encouraged their athletes to use PS as opposed how coaches taught PS. Therefore a more detailed measure of coaching PS was required. Thus the aim of this chapter was to develop and validate a measure of coaching PS to be used in a subsequent large-scale intervention.

Much of the initial research into the coaching of PS has used survey type measures of coaching PS which are atheoretical and unvalidated (Gould et al., 1999; Gould, Hodge, Peterson, & Gianni, 1989; Hall & Rodgers, 1989). For example, Hall and Rodgers (1989) implemented one of the first coaching PS interventions and utilised several coaching PS questionnaires. They developed The Use of Mental Training Questionnaire for Coaches (UMTQ) to measure coaches' prior use of mental training techniques and The Skaters' Perception of Coaches Use of the Mental Training Package (SPMTP) to measure athletes' perceptions of changes in the coaching PS they received. The questionnaire design was informed by the content covered within the intervention (imagery, task focusing, competitive

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strategies, cue words, relaxation) and involved little theoretical rationale. Further, and more crucially, Hall and Rodgers failed to take steps to establish reliability or factorial validity of the measures they created.

More recently research into coaching PS has attempted to improve the quality of measurement, yet significant weaknesses in conceptualisation and statistical validity are evident. As an example, Paquette and Sullivan (2012) investigated the relationship between coaches' attitudes regarding PS and coaching PS behaviour. In order to measure coach PS behaviours the authors constructed a scale based on the Mental Skills Questionnaire (Bull, Albinson, & Shambrook, 2002: MSQ). The original MSQ measures use of seven mental skills: (a) imagery ability, (b) mental preparation, (c) self-confidence, (d) anxiety and worry management, (e) concentration ability, (f) relaxation ability, and (g) motivation. However, the validity and conceptualisation of the original MSQ (Bull et al., 2002) are also in doubt as its psychometric properties are yet to be documented. Furthermore, despite being a measure of mental skills, some subscales (e.g., motivation and self-confidence) may not be consistently described as 'skills' and other subscales refer to ability rather than use of skills (see Thomas, Murphy & Hardy, 1999; Tremayne & Newberry, 2005; Vealey, 1988; Weiss, 1991; for more regarding this debate). The coaching MSQ created by Paquette and Sullivan (2012) asked coaches to rate how frequently they implemented each of the seven MSQ skills into their coaching sessions. Prior to administration, Paquette and Sullivan (2012) did conduct a focus group and pilot study which supported the face and construct validity of this measure. However, neither exploratory or confirmatory factor analyses were reported. Furthermore, the results of Structural Equation Modelling of four factors (coach perceptions; coaching PS as measured by the coaching MSQ; athlete perceptions; athlete confidence) revealed fit statistics of CFI=.89, NNFI=.868, RMSEA=.11 and SRMR=.11 which do not indicate adequate model fit according to conventional criteria (e.g., Hu & Bentler, 1999). Therefore, the

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Coaching MSQ theoretical underpinnings and factorial validity remain questionable and so was not thought appropriate for measuring coaching PS in this instance.

In contrast to these more problematic measures, one questionnaire which does measure some elements of coaching PS and has undergone significant development and statistical validation is the Coach Behaviour Scale for Sport (CBS-S; Côté et al., 1999). The CBS-S was designed to measure a broad range of the most frequent and important coach behaviours and was developed based on qualitative research with athletes and coaches. An initial exploratory factor analysis revealed a six factor solution (physical training and planning, technical skills, personal rapport, goal setting, mental preparation and negative personal rapport) which accounted for 79.8% of the total variance (Côté et al., 1999). Each factor demonstrated high internal consistency and adequate test-retest reliability. Furthermore, the CBS-S has been shown to have predictive validity as athletes' ratings on the CBS-S have been significantly related to athlete anxiety (Baker, Côté, & Hawes, 2000) and athlete use of coping strategies (Nicolas, Gaudreau, & Franche, 2011).

The two subscales of the CBS-S potentially relevant to the measurement of coaching PS are the mental preparation and goal setting subscales. The mental preparation subscale measures coach provision of advice regarding performing under pressure, staying focussed and being confident. Providing advice about mental preparation is likely to be closely linked to the coaching of PS, however it was considered overly general to capture changes in the coaching of PS in this context. For example, a coach can provide advice about mental preparation which does not necessarily involve PS (e.g., to stay confident in competition you need to work hard in training). The goal setting subscale of the CBS-S assesses coach support regarding identification, development and monitoring of goals. Whilst this subscale appropriately measures some aspects of coaching goal setting, not all behaviours found in Study 1 were covered by this scale such as explaining why goal setting is important. Also the

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piloted and subsequent coach intervention allowed coaches to choose one of four PS (goal setting, imagery, relaxation and self-talk) to work on during the intervention (see Chapter 2 and 4). Therefore a questionnaire which could be applied to the coaching of all four psychological skills was required. Thus despite the advantages of CBS-S, the mental preparation and goal setting subscales of the CBS-S were not used to measure the coaching of PS in the current research.

A more detailed approach to measuring the coaching of PS was established by Jedlic et al., (2007) who developed coaching PS questionnaires to assess coach and athlete perceptions of coach encouragement of imagery use. The Coaches' Encouragement of Athlete Imagery Use Questionnaire (CEAIUQ) and the Coaches' Influence of Athlete Imagery Use Questionnaire (CIAIUQ) were designed to cover the four W's of imagery use (cf. Munroe, Giacobbi, Hall & Weinberg, 2000): when imagery is used, where it is used, why it is being used and what is being imaged. All items within the questionnaires focussed on the coach behaviour of 'encouragement' which can be defined as 'The act of trying to stimulate the development of an activity, state, or belief' (Oxford Dictionaries, 2014). The questionnaires' factor structure and psychometric properties are yet to be confirmed, however the CEAIUQ and CIAIUQ has been shown to have internal consistency and discriminant validity (Jedlic et al., 2007). Furthermore, the CEAIUQ and CIAIUQ have been used in several intervention studies (Callow et al., 2010; Edwards et al., 2012; Hall et al., 2007) and were sensitive to behaviour change regarding coaching PS on several occasions (Callow et al., 2010; Hall et al., 2007). Based on the aims of the pilot intervention (see Chapter 2) and the past utility of the CEAIUQ and CIAIUQ, it was clear that coach encouragement of PS was a relevant behavioural outcome which had been previously captured. Therefore, we decided that coach encouragement was the principal coaching behaviour to measure within

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the pilot intervention. For the purposes of the current intervention, we piloted a questionnaire to capture coach encouragement of goal setting, imagery, relaxation and self-talk.

The Coach Encouragement of Psychological Skills Questionnaire (CEPS) was created for the pilot study by adapting the Test of Performance Strategies questionnaire -2 (TOPS-2; Hardy et al., 2010). The TOPS-2 was selected because it is a psychometrically valid questionnaire which measures athlete use of all four basic psychological skills (goal setting, imagery, self talk and relaxation; Hardy et al., 1996) in training and competition. The eight subscales were adapted to ask about coach encouragement of mental strategies (e.g., *I set realistic but challenging goals for practice* was adapted to *my coach encourages me to set realistic but challenging goals for practice*, see Chapter 2 and Appendix A for more details).

The CEPS was trialled in the pilot coaching PS intervention (Study 1) which was evaluated using various questionnaires and follow-up participant interviews. Intervention piloting such as this, is recommended by the MRC guidelines (Craig et al., 2008) as a process which can improve measurement and intervention design (Hardeman et al., 2005). Indeed, the mixed methods evaluation of the pilot intervention aided a more comprehensive understanding of how coaching PS should be measured. Quantitatively, following the pilot intervention athlete CEPS ratings increased significantly, with the coach encouragement of PS which were developed during the intervention increasing to a greater extent than coach encouragement of other PS, which were not developed. However, the qualitative analysis of coach and athlete interviews suggested that coaching PS consisted of a range of behaviours and coach encouragement was only one component of coaching PS. Indeed, within Study 1, coaches and athletes talked about using PS cues within coaching instructions and providing athletes with choices and explanations of PS, alongside encouraging athletes to use PS. Furthermore, it was thought that the different coaching PS behaviours could have differential effects on athlete outcomes. In particular, it seemed that coaches who provided more

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explanations about PS were more likely to enhance athletes' awareness of PS and the effective use of PS over and above coaches who simply instructed their athletes to use PS. Given these findings, it became apparent that CEPS as a measure that solely captured coach encouragement of PS was overly narrow, and an alternative more comprehensive measure of coaching PS was required.

Therefore, the aim of this chapter was to create and validate a more comprehensive coaching of PS questionnaire which included a greater range of coaching PS behaviours and would allow for differential predictions for the different behaviours. The first step in the development of the new measure, The Coaching Psychological Skills Scale (CPS) was Study 2, an additional qualitative analysis of the coach and athlete interviews conducted in the pilot intervention. The secondary analysis was required to gain a more in-depth and organised understanding of the nature of coaching of PS to inform questionnaire development. Subsequently within Study 3, the questionnaire items were developed, the questionnaire factor structure was refined and validated using Confirmatory Factor Analyses, and discriminant validity was tested. Finally, Study 4 investigated the questionnaires concurrent and predictive validity.

Study 2. Qualitative analysis of coaching PS

In Study 2, the findings from the qualitative interviews (Chapter 2) were re-analysed using an inductive approach of hierarchical content analysis, in order to create a detailed and structured description of the nature of coaching PS.

Method

Participants. Four coaches participated in the interviews in Chapter 2 (n females = 2, n males = 2; M years experience coaching = 15.25, SD = 6.13; M age = 45.00, SD = 14.99). Five athletes who had been involved in the pilot intervention agreed to be interviewed (M age

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= 18.0, $SD = 1.83$, n males = 2, n female = 3, M years' experience of the sport = 6.50 SD 1.29). The athletes competed at national level ($n = 2$) and international level ($n = 3$).

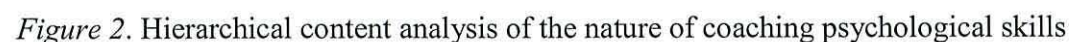
Procedure and Data Analysis. Within the current study, the interview transcripts were analysed by hierarchical content analysis (Côté, Salmela, & Russell, 1995) using NVivo software. In this analysis, themes and categorisations were developed inductively from the data rather than using any pre-determined categories to organise the data. All the data describing the coaching of PS were identified as meaningful units of analysis and these text units were coded into nodes ($n = 154$) according to the topic they referred to. Similar nodes were then grouped together to establish raw themes according to their internal homogeneity and external heterogeneity (Patton, 2002). The raw themes were then grouped into higher order themes and their representativeness was examined.

In order to avoid researcher bias (see Biddle, Markland, Chatzisarantis, & Sparkes, 2001) and increase the creditability and dependability of results, an additional researcher with expertise in coach interventions and PST was invited to act as a “devil’s advocate”. The additional researcher critically questioned the analysis (Marshall & Rossman, 1995) by challenging the inclusion of nodes and themes and actively searching for contradictions in the hierarchical model of coaching PS. Both researchers met on three occasions and discussed each raw theme in turn, regularly returning to initial nodes and interview transcripts. During the meetings, the researchers worked collaboratively to resolve identified issues and refine the model to describe the nature of coaching PS.

Results

Following the content analysis, 20 first level clusters of raw themes were identified. These were then grouped into six dimensions under two categories; the fundamental coaching of PS and the needs supportive coaching of PS. The fundamental coaching of PS involved coach directed behaviours within coaching sessions of: (a) observation of PS use, (b) targeted

cueing of PS, (c) instructing to use PS, and (d) reinforcing PS use. In contrast the needs supportive coaching of PS involved tailoring the coaching of PS to the individual and increasing athlete engagement regarding PS including; (e) providing explanations of PS, and (f) seeking athlete involvement (refer to Figure 2 for a summary of the data analysis). The following sections describe these aspects of coaching PS in more detail.



Observation of PS use. The coaching of PS involved coaches observing athletes' use of PS. The coaches talked about watching athletes' use of PS and noticing how effective it was. One coach said "I try to now pick up on them much more, on the negativity of what they talk about." Another coach suggested:

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Also coaches mentioned testing athletes' use of PS in various ways "we incorporate a little bit of psychological skills into their group classes in terms of testing their confidence, watching their motivation going up and down."

Targeted cueing of PS. Targeted cueing of PS involved coaches giving athletes instructions of a psychological nature to focus an athlete's attention on helpful stimuli (i.e., a coach instructing an athlete to imagine the action before they attempt it) without necessarily providing any formal explanations surrounding PS and their use. Targeted cueing can involve either instructions regarding technique or motivating athletes.

Instructing using PS cues. When giving technical instructions coaches often instructed athletes to focus on a certain cue or key word. For example, one coach suggested; "when she's in the blocks 'just explode, that's all I want you to think about, explode'." Athletes also talked about coaches using cues, one athlete said "if I wanted to move faster, she'd say right you're on a steeple track, think you're on a steeple track...so I'm thinking, right away steeple track, racing." Coaches also used imagery based cues to deliver instructions; "She's used, like a vacuum when you want to spin and you're pulling yourself in, like a vacuum would that's spinning round. She uses like, picture things so you can resemble it to things."

Motivating using PS cues. Coaches also integrated PS cues into their sessions to help motivate their athletes. Coaches and athletes suggested that coaches set goals for the athletes and used imagery-based descriptions to encourage and motivate the athletes. One athlete described how his coach motivated him in this way:

His ambition for me is to win Gold.....And he, just, he really says to keep that in here. To keep it in here, keep it in here.....He says visualise yeah, visualise yourself doing it, you know. He says, you know, look. Get looking forward to *the event* 'cause it'll soon be here.

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Instructing to use PS. It was found that coaches directly instruct their athletes to use PS, one athlete said “She’ll say can you do this for me at home like the drawings and stuff (*drawing out a performance routine*).” Another coach instructed his athletes to use imagery “I made a point of working with after the *Programme Facilitator* visited for about a month, of them absolutely using imagery as a part of every exercise.”

Reinforcing PS use. Coaches and athletes talked about coaches reinforcing athletes use of PS, for instances on athlete said:

So we were encouraged to really do as much as we can with the drawing and the mental imagery and the thinking of, like the hand pathways, the working together *outside the arena* (words changed to protect identity of the athletes), to get as much of that done there.

Coaches also reminded athletes and repeated instructions about PS:

she is repetitive. I think she’ll, she’ll keep, she won’t just say it one week and then leave it three or four weeks and or not mention it. She’ll do it every week, every, every training session, even if it’s only once during the session, she’ll remind you, you know, to, to use the skills that, she’s, she’s taught

Needs supportive coaching of PS. In addition to the fundamental coaching of PS, a more athlete-centred approach to coaching PS was also identified. This category involved coaches helping the athletes to understand what PS are and how to use them in a way which would be relevant to them. After establishing the two dimensions of providing explanations and seeking athlete involvement, the parallel between these dimensions and SDT need supportive elements of structure and (Markland & Tobin, 2010) became apparent, and so the category was named ‘Needs supportive coaching of PS’.

Providing explanations of PS. Some coaches went beyond giving PS instructions and explained to athletes how to use PS and what the helpful outcomes of using PS could be. For

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instances, “she just gives you like, advice on how to do it (imagery) and how it could help you and if you have a question about it then she’ll, she’ll answer it.”

Seeking athlete involvement. Some coaches talked about ensuring athlete ownership over PS activities by giving them choices of PS exercises, for example:

Three or four different breathing techniques, I got into the habit of, of showing the *athletes* each of them and then letting them choose which worked for them because I felt very much, they needed ownership of whatever, they, they, did.

Coaches also asked athletes questions and had discussions with the athletes to help their athletes understand their use of PS, in this example an athlete talks about questions about using imagery perspectives: “so she asked me, do you look at yourself like, if, as if you’re on a TV or do you look at yourself as if it’s through your eyes, and then she explained how the different ones.” Another element of seeking athlete involvement was coaches trying to coach PS in a way which would be meaningful to the athletes, for example one coach talked about finding: “ways to introduce things to the *athletes* that would be fun and relevant”.

Discussion

In summary, the results of the hierarchical content analysis suggested that there were six dimensions of coaching PS which could be summarised under two categories, the fundamental coaching of PS and the needs supportive coaching of PS. The fundamental coaching of PS involved coach directed behaviours within coaching sessions of (a) observation of PS use, (b) targeted cueing of PS, (c) instructing to use PS, and (d) reinforcing PS use. In contrast the needs supportive coaching of PS involved tailoring the coaching of PS to the individual and increasing athlete engagement regarding PS by, (e) providing explanations of PS, and (f) seeking athlete involvement (refer to Figure 2 for a summary of the data analysis). The two dimensions of coaching PS describe different forms of coaching

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PS. The fundamental coaching of PS behaviours, are general coaching PS activities which give an indication of the breath of coaching PS behaviours which are taking place. These fundamental behaviours do not provide an indication of coach skill or effectiveness when coaching PS. For example, giving PS instructions or suggesting an athlete uses PS, is fundamental to the coaching of PS taking place. However, a coach could instruct an athlete to use imagery in different ways, could give explanations which motivate an athlete to use PS, or the coach might just 'tell' the athlete to use imagery and the athlete could be unclear why or how they should use imagery. Therefore, for the purposes of the subsequent study it seemed logical to create two scales, one which captured the fundamentals of coaching PS and another which captured the quality or need supportive nature of coaching PS.

The two dimensions of providing explanations and seeking athlete involvement, could be described as components of SDT need support (Markland & Tobin, 2010). SDT theorists have suggested that providing need support involves three key elements, interpersonal involvement, structure and autonomy (Markland & Tobin, 2010). Structure involves helping individuals to develop clear expectations and belief that they are able to effectively engage with a task (Markland & Tobin, 2010). Structure support is provided via explanations regarding behaviour-outcome contingencies (Silva et al., 2010) and positive feedback regarding progress. Therefore, within this study the explanation provision of PS provided by the coach could be described as need supportive and a key component of structure. Autonomy support involves encouraging individuals to engage in tasks for their own reasons and is provided by minimising pressure, offering choice and acknowledging an individual's perspective (Markland & Tobin, 2010; Silva et al., 2010). Within the current study, the dimension of seeking athlete involvement regarding PS included; giving choices of PS exercises, asking athletes questions about their use of PS, and coaching PS in a way which would be meaningful to the athletes, which could all be described as autonomy supportive

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behaviours. Given these parallels between the findings in this study and that of SDT theorists, the SDT literature was used to inform the questionnaire development in the subsequent studies, and items relating to explanation giving and seeking athlete involvement were designed to describe need supportive behaviours. It is noteworthy that the conceptualisation of Coaching PS which results from this study mirrors many of the proposals within the sport development literature, regarding the principles of effective coaching. Clearly, coaching involves instructing and providing knowledge of specialised activities or movements (Potrac & Cassidy, 2006). Furthermore, it has been shown to be beneficial when coaches to individualise coaching according to different athletes (Amorose, 2007); seek interaction with athletes (Jones & Standage, 2006) and provide feedback and a clear rationale for coaching activities (Amorose, 2007).

Study 3. Questionnaire Development and Psychometric questionnaire validation

This study aimed to create and validate two coaching PS questionnaires to measure the fundamental coaching of PS and the need supportive coaching of PS. Study 3 included three phases. The first phase involved item development, Phase 2 involved scale refinement and testing the factorial validity of both scales, and finally Phase 3 involved testing the discriminant validity of the new questionnaires.

Phase 1. Item development

Based on the results of the qualitative study, we developed the questionnaire items for each theme within the fundamental and need supportive coaching of PS. To measure the Fundamental Coaching of PS an initial pool of 36 items was developed using the qualitative results as a basis. Each item referred to one of the following themes (a) observation of PS use (b) targeted cueing of PS (c) giving PS instructions, and (d) reinforcing PS use. Feedback on the clarity and representativeness of each item was then obtained from the research team and other Sport Psychologists ($n = 4$ reviewers in total). Items that were not considered relevant

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and/or fully comprehensible by one of the four reviewers were deleted from the pool. Some of the remaining items were slightly modified based on the reviewing process. The Coaching of Psychological skills-Fundamental (CPS-F) questionnaire consisted of 21 randomly ordered items (see Table 6 for items). Participants were asked to rate how frequently the situations occur on a 5-point scale (*0 = never; 1 = rarely; 2 = sometimes; 3 = often; 4 = Always*). In order to measure the need supportive coaching of PS a pool of 19 items were developed.

Table 6.

Original 21 items for CPS-F questionnaire

Questionnaire Subscales	Original Questionnaire Items
<i>Factor 1: Observation of PS use</i>	<ol style="list-style-type: none"> 1. My coach watches out for my use of <i>PS</i> during my sport. 2. My coach picks up on my use of <i>PS</i>. 3. My coach notices how much I use <i>PS</i>. 4. My coach tests my use of <i>PS</i>. 5. My coach observes my use of <i>PS</i>.
<i>Factor 2: Targeted Cueing of PS</i>	<ol style="list-style-type: none"> 1. My coach includes specific <i>cues</i> in his/her instructions. 2. My coach talks about specific <i>cues</i> to help me to be in the right mental state. 3. My coach describes specific <i>cues</i> to make things easier to understand. 4. My coach tells me technical information by talking about specific <i>cues</i>. 5. My coach talks about <i>specific cues</i> to motivate me.
<i>Factor 3: Instructing to use PS</i>	<ol style="list-style-type: none"> 1. My coach asks me to use <i>PS</i>. 2. My coach tells me to use <i>PS</i> when I'm doing my sport. 3. My coach asks me to think about using <i>PS</i> when I'm doing my sport. 4. My coach tells me to think about a <i>specific cue</i> when I am performing my sport. 5. My coach instructs me to use <i>PS</i>. 6. My coach instructs me to focus on a <i>specific cue</i> whilst doing my sport.
<i>Factor 4: Reinforcement of coaching PS</i>	<ol style="list-style-type: none"> 1. My coach reminds me to use <i>PS</i>. 2. My coach repeats instructions or information about <i>PS</i>. 3. My coach encourages me to use <i>PS</i>. 4. My coach reinforces my use of <i>PS</i>. 5. My coach corrects my use of <i>PS</i>.

These items were informed by the qualitative analysis and existing measures of Need Support (see Markland & Tobin, 2010). After undertaking the same review process as above, items were removed and adjusted. The Need Supportive Coaching of Psychological skills questionnaire (NSCP) consisted of 14 randomly ordered items (see Table 7 for items).

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Participants were asked to rate their experiences of coaching PS on a 5-point scale (*0 = Not at all true of me, 4 = Very true of me*). The two scales used different anchors on their rating 0-4 points rating scale, the CPS-F anchors were ‘*never to always*’ to capture ratings of the frequency of coaching behaviour, whereas CPS-NS mirrored Markland & Tobin’s measure using ‘*not at all true of me to very true of me*’ to capture ratings athletes’ personal experiences of the coaching of PS when it occurs.

Table 7

Original 14 items for CPS-NS questionnaire

Questionnaire Subscales	Original Questionnaire Items
<i>Factor 1: Providing explanations of PS</i>	<ol style="list-style-type: none">1. My coach suggests ways I could use <i>PS</i>2. My coach explains how to use <i>PS</i> effectively3. My coach makes it clear what to expect from using <i>PS</i>4. My coach provides me with positive feedback regarding my use of <i>PS</i>5. My coach gives me good advice about <i>PS</i>6. My coach explains why using <i>PS</i> could help my performance7. My coach makes it clear what I need to do to get positive effects from using <i>PS</i>
<i>Factor 2: Seeking athlete involvement</i>	<ol style="list-style-type: none">1. My coach asks me questions about my use of <i>PS</i>2. My coach encourages me to take my own initiative about using <i>PS</i>.3. My coach provides me with a range of ways to use <i>PS</i>.4. My coach talks to me about <i>PS</i> in a way which is relevant to me.5. My coach and I discuss using <i>PS</i>6. My coach encourages me to reflect on my use of <i>PS</i>7. My coach takes into account my needs when speaking with me about <i>PS</i>.

The questionnaires were developed specifically for the subsequent intervention (see Chapter 4), for which coaches chose one psychological skill out of goal setting, imagery, relaxation, self-talk to focus on. Therefore we developed questionnaire items to use general item stems ‘e.g., my coach reminds me to use....’ with interchangeable subjects for the appropriate psychological skill chosen by the coach ‘my coach reminds me to usegoal setting.’ or ‘my coach reminds me to use.....imagery.’

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Phase 2. Factorial Validity

Following item development the factorial validity of the CPS-F and CPS-NS of each subscale was assessed, the subscales were subsequently refined prior to full model factorial validity was tested.

Method.

Participants. The athletes recruited to participate in this study were over the age of 14, received regular coaching and were actively competing in sport(s). Due to the nature of the questionnaires to be validated, performance-level athletes who would be likely to receive coaching of PS were specifically sought. A total of 471 athletes agreed to participate in the study (M age = 17.8 ± 5.4 , $n = 258$ male, $n = 209$ female). At the time of data collection athletes in the sample had been participating in 20 different sports for an average of $7.4 (\pm 5.4)$ years. Responses provided by 440 of the 471 indicated that, 0.8% were competing professionally, 28.9% internationally, 38.4% nationally, 10.2% regionally, 8.7% in British Universities Leagues, and 6.4% recreationally. All athletes stated that they were receiving regular coaching, 41.8% received more than 25 hours of coaching a month, and 21% between 15-25 hours, 12.5% between 5-10 hours, 11.7% between 1-5 hours a month. Of the 471 athlete who participated only 284 reported the qualification level of their coach (UKCC levels or equivalent) of which, 11% of coaches were level 4 qualified, 27.4% level 3, 18.0% level 2 and 3.8% were level 1 qualified.

Data collection procedure. The team obtained Institutional ethical approval and all participants provided informed consent to participate in the study. For any athletes under the age of 16 the adult in care of the young person provided their consent. There were four versions of the questionnaire each of which applied to a different basic PS and we allocated each athlete randomly to one version of the questionnaire to complete (goal setting $n = 129$, imagery $n = 117$, relaxation $n = 106$ and self-talk $n = 107$). We told the athletes the purpose

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of the study and gave anti-social desirability instructions to emphasise confidentiality of their data from their coach. The data was collected by hand at sport training and competition venues. Either a financial incentive of a £50 prize draw was offered to encourage athletes to participate or they were encouraged to participate as their coach was part of Study 5.

Analyses. Preliminary analysis revealed very few missing data and no single item was omitted by more than 5% of the 471 participants (mean 3% missingness across BCP items; mean 4.7 missingness across NSCP items). Thus the influence of missing data on the results was thought to be negligible (Tabachnick & Fidell, 2007) and listwise deletion was adopted. The entire response scale on both measures was used suggesting that the items were sufficiently sensitive to detect differences in coaching received by athletes.

Confirmatory factor analyses were conducted on the two questionnaires (the CPS-F and CPS-NS) separately to ascertain their structural integrity using Mplus 7 (Muthén & Muthén, 2012). Following the recommendations of Jöreskog (1993) a sequential approach to model testing was adopted involving three stages. First, convergent validity of the items within each subscale was tested using separate single-factor models. Second, ambiguous items were identified using diagnostic information from the single factor models and conceptual arguments, and removed where necessary. Finally, the full-model was tested.

A selection of goodness-of-fit indices were used to evaluate the fit of both: the CPS-F and the CSP-NS. The indices included; Satorra-Bentler Chi-square (S-B χ^2 Satorra & Bentler, 2001); Tucker-Lewis index (TLI; Tucker & Lewis, 1973), the Comparative fit index (CFI; Bentler, 1990), the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990) and the Standardised Root Mean Square Residual (SRMR). The Satorra-Bentler chi-square was used to correct for non-normality. The criteria set for a good model fit included a non-significant Satorra-Bentler chi-square ($p > .05$). However it has been recommended that the chi-square be used more subjectively as an index of fit rather than a test statistic, where large

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chi-square values relative to degrees of freedom indicate a poor fit, and small values indicate a good fit. Specifically, Shumacker and Lomax (1996) suggested that a X^2/df ratio of between 1.0 and 5.0 indicated good fit, whereas Byrne, Shavelson & Muthén (1989) proposed a more stringent ratio where only values below 2.0 suggest acceptable model fit. Therefore, in the current study we referred to a X^2/df ratio nearing 2.0 or less than 2.0 to as an indication of model fit in conjunction with additional fit statistics based on Hu and Bentler's (1999) recommendations. The primary indices of fit and cut off values were somewhat conservative; TFI and CFI > 0.95, RMSEA < 0.06 and SRMR < 0.08 in order to indicate an acceptable fit between each hypothesised model and the observed data. Clearly, the use and interpretation of χ^2 and other criteria to establish model fit has been widely debated (e.g., Hayduk & Glaser, 2000; Barrett, 2007; Markland 2007) and it is important to note that Hu and Bentler's (1999) cut off criteria are not "golden rules" for interpretation of model fit (see Marsh, Hau, & Wen, 2004).

The items in each subscale were refined using standardised factor loadings as values below <.40 were deemed as low (Mullan, Markland, & Ingledew, 1997). The modification indices of the covariances were then examined to highlight possible improvements to each model fit. Before items were removed, questionable items were scrutinised to assess the theoretical grounds for item removal or inclusion. Once we had removed items, we tested the single model fits again before the full model was tested and Cronbach Alphas were computed.

We validated the results from the four versions of the questionnaire as one set of data. We thought it appropriate to validate the scales in this way, as all four versions of the questionnaire included the same items with the same stems listed in the same order. Therefore, each item, regardless of the specific PS that was included had the same behavioural meaning and it was the only topic which differed between the four versions. This

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approach to item equivalence (using the same item stem and interchangeable subjects) is commonly used in self efficacy research (see Moritz, Feltz, Fahrbach, & Mack, 2000 for summary), thus we deemed it appropriate here.

Results.

Coaching of PS Scale – Fundamental (CPS-F).

Single factor models for each factor were tested first to eliminate any poor items. The fit statistics for these single factor models are shown in Table 8.

Table 8

Coaching of PS-Fundamentals, Initial Fit Statistics for Single Factor Models of Each Subscale

CPS-F subscales	No. of items	$S-B \chi^2_{(df)}$	RMSEA	CFI	TLI	SRMR
Observation of PS use	5	14.90* ₍₅₎ ; $p = .01$	.067*	.99	.98	.02
Targeted cueing of PS	5	23.05* ₍₅₎ ; $p < .00$	.090*	.98	.96	.02
Instructing to use PS	6	23.79 ₍₉₎ ; $p = .01$	.061*	.99	.98	.02
Reinforcing PS use	5	9.47 ₍₅₎ ; $p = .09$	.050	.10	.99	.01

Note. * Indicates an unacceptable level of fit

Examination of the factor loadings and modification indices for each subscale revealed a number of items which could be removed in order to improve model fit. Each subscale is considered in turn.

Observation of PS Use. Item 5, “My coach observes my use of PS” was removed on theoretical grounds, as it was thought that athletes would have difficulty answering this question, as they would not necessarily be aware of their coach observing. The other items in the scale however, were thought to be more indicative of coaching behaviour which the athletes would have more direct experience of “ e.g., My coach picks up on my use of PS”.

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Following the removal of item 5, the observation subscale fit was acceptable (See Table 6 for all items and Table 9 for fit).

Targeted cueing of PS. Item 5, “My coach talks about *PS* to motivate me” was removed due to high modification indices for covariance between error terms with other items, in particular the item “My coach includes specific goals in his/her instructions.” Further examination of the theoretical meaning of item 5, established that it was not ideally suited to each PS and stated a highly specific purpose of coaching PS (i.e., to motivate an athlete). Indeed, it was thought that item 2 “My coach talks about PS to help me to be in the right mental state.” covered a similar topic to item 5, but was more general and so more applicable to more of a range of athletes. Following the removal of item 5, the targeted cueing of PS subscale fit was acceptable (see Table 6 for items and Table 9 for fit).

Instructing to use PS. In the single factor model fit of the instructing to use PS scale, a high modification index was evident for covariance between error terms of item 4 “My coach tells me to think about a *specific cue* when I am performing my sport” and item 6 “My coach instructs me to focus on a *specific cue* whilst doing my sport”. Upon inspection, these two items were similar to each other and they were theoretically different to other items within the instructing scale. Although item 4 and 6 referred to instructing, the items were thought to be more representative of instructing using targeted cueing rather than instructing to use PS. Following the removal of item 4 and item 6, the targeted cueing of PS subscale fit was acceptable (see Table 6 for all items and Table 9 for fit).

Reinforcing PS use. Item 5, “My coach corrects my use of *PS*”, had a low factor loading (0.24) and when the theoretical relevancy of this item was appraised, it was decided that a coach correcting an athlete’s self-talk, for example, deviated from purpose of the subscale as it implies a coach reducing errors in athlete’s PS use rather than reminding and

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encouraging an athlete to use PS. Following the removal of item 5, the targeted integration of PS subscale fit was acceptable (see Table 6 for all items and Table 9 for fit).

Table 9

Fit statistics for Revisions Coaching PS Behaviours- Fundamentals

CPS-F Subscales	No. of items	<i>S-B</i> $\chi^2_{(df)}$	<i>RMSEA</i>	<i>CFI</i>	<i>TLI</i>	<i>SRMR</i>
Observation of PS use	4	4.54 ₍₂₎ ; $p = .10$	.054	.99	.99	.01
Targeted Cueing of PS	4	5.54* ₍₂₎ ; $p = .06$	.063*	.99	.99	.01
Instructing to use PS	4	2.38 ₍₂₎ ; $p = .30$	.021	1.0	.99	.00
Reinforcing PS use	5	5.40 ₍₂₎ ; $p = .07$	.062*	1.0	.99	.01
Full Four factor model	17	270.21* ₍₉₈₎ ; $p < .00$	.064*	.96	.96	.03
Full Three factor model	13	158.39 ₍₉₈₎ ; $p < .00$	.060	.97	.97	.03

Note. * Indicates an unacceptable level of fit according to criteria above (Hu & Bentler, 1999)

Full Model (CPS-F). The full model was then tested to assess the fit of the hypothesised structure of the whole scale and to highlight any poor or cross-loading items. The four factor model of the CPS-F fit indices are displayed in Table 9, showing an adequate model fit. However, according to the most stringent criteria, χ^2/df ratio and RMSEA were slightly above values indicative of a good model fit. The intercorrelations between the four subscales ranged from .63 to greater than 1.0 indicating significant conceptual overlap between some of the subscales. In particular, the correlation between instructing to use PS and reinforcement was 1.3. Thus we subjected the data to a re-analysis and compared a two factor model of instructing and reinforcing PS against a simulated a single factor (by fixing the correlation between instructing and reinforcement at 1). The analysis revealed the following fit statistics for the two factor model: $S-B \chi^2(19) = 65.81, p < .000$; RMSEA = 0.076; CFI = 0.98; TFI = 0.97; SRMR = 0.02. However the simulated one-factor model would not converge. Therefore in order to compare whether instructing to use PS and

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reinforcement should be treated as two factors or one factor, a “true” one-factor model was run where all 8 items (4 instructing and 4 reinforcement) loaded on to one factor. This model revealed the following fit statistics ($S-B \chi^2(20) = 70.880, p < .000$; RMSEA = 0.077; CFI = 0.98; TFI = 0.97; SRMR = 0.02). In comparing the one factor model against the two factor model, the one factor model resulted in slightly lower Akaike information criterion (8004.48 vs 8009.00) suggestive, on the basis of parsimony, that a single factor of instructing and reinforcement was more appropriate. Crucially, a single factor including instructing and reinforcement was considered theoretically more appropriate. Conceptually, coaches who reinforced or reminded athletes about using PS would have been likely to have already given athletes some instructions about PS. Therefore, it was decided that instructing about PS and reinforcing athletes PS use were components of coach encouragement of PS use, and as such a single subscale of coach encouragement was created. Therefore the three factor model of CPS-F was tested, and the fit indices are displayed in Table 9 and factor loadings are displayed in Table 10. The creation of the three factor model slightly improved the model fit reducing the χ^2/df ratio and RMSEA to levels indicative of a good model fit and reducing the intercorrelation between the subscales. However, the intercorrelation between observation subscale and coach encouragement remained high, at .939, however the standard error was extremely low (0.012). Therefore the intercorrelation plus the standard error multiplied by two was less than a correlation of 1, meaning that the correlation does not encompass unity (see Smith, Arthur, Hardy, Callow & Williams, 2013 for an example).

Therefore, despite a large amount of shared variance between the observation and coach encouragement subscales they retained some unique variance and were empirically distinct. Furthermore, the three factor model was deemed conceptually more appropriate given the separate themes identified in Study 2 and that coach observation of PS use (e.g., testing and noticing) is distinct from coach encouragement to use PS (e.g., instructing to use

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PS and reminding athletes to use PS). Finally, the Cronbach alphas (see Table 10) suggested good internal consistency within each scale.

Table 10

Coaching Psychological Skill –Fundamentals Final Item Means, Standard Deviations and Factor Loadings

Factor Items	Means	SD	Factor Loadings
<i>Factor 1: Observation of PS use ($\alpha = .89$)</i>			
5. My coach watches out for my use of PS during my sport.	1.57	1.18	0.78
6. My coach picks up on my use of PS.	1.44	1.25	0.90
7. My coach notices how much I use PS.	1.34	1.22	0.85
8. My coach tests my use of PS.	1.04	1.13	0.78
<i>Factor 2: Targeted Cueing of PS ($\alpha = .94$)</i>			
5. My coach includes specific cues in his/her instructions	2.37	1.15	0.80
6. My coach talks about specific cues to help me to be in the right mental state .	2.17	1.11	0.76
7. My coach describes specific cues to make things easier to understand.	2.13	1.23	0.75
8. My coach tells me technical information by talking about specific cues.	1.98	1.27	0.77
<i>Factor 3: Encouragement of PS use ($\alpha = .70$)</i>			
1. My coach asks me to use PS (instruction scale)	1.60	1.34	0.84
5. My coach instructs me to use PS (instruction scale)	1.45	1.30	0.90
1. My coach reminds me to use PS (reinforcement scale)	1.55	1.27	0.89
3. My coach encourages me to use PS (reinforcement scale)	1.64	1.32	0.89
4. My coach reinforces my use of goal setting (reinforcement scale)	1.46	1.22	0.88

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Coaching of PS Scale – Need Supportive (CPS-NS).

Single factor models for each factor were tested first to eliminate any poor items (see Table 7 for original items). The fit statistics for these single factor models are shown in Table 11.

Table 11

Coaching of PS – Need Support, Initial Fit Statistics for Single Factor Models of Each Subscale

CPS-NS Subscales	No. of items	$S-B \chi^2_{(df)}$	RMSEA	CFI	TLI	SRMR
Providing explanations of PS	7	50.89* ₍₁₄₎ ; $p < .00$	.078*	.98	.98	.02
Seeking athlete involvement	7	40.00* ₍₁₄₎ ; $p < .00$	.066*	.98	.98	.02

Note. * Indicates an unacceptable level of fit according to criteria above (Hu & Bentler, 1999)

Subsequent examination of the modification indices and theoretical meaning of each item revealed a number of items which could be removed (see Table 7). Each subscale is considered in turn.

Explanation provision. The factor loadings on this subscale ranged from 0.83 to 0.91. However, item 1, “My coach suggests ways I could use PS” and item 2, “My coach explains how to use PS effectively” had high modification indices for covariance between their error terms, and between error terms of other items. Need supportive explanation provision involves helping individuals to develop clear expectations (Markland & Tobin, 2010) and explaining behaviour-outcome contingencies (Silva et al., 2010) whilst minimising pressure. Conceptually it was thought that item 1 and item 2 should be removed as they did not sufficiently describe need-supportive explanation giving. For instance, a coach could suggest ways to use PS or how to use PS in an autocratic way without fully explaining why PS are relevant for that athlete. In addition, it was thought that item 1 should be removed as it was

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similar to item 3, of the seeking athlete involvement scale “My coach provides me with a range of ways to use PS.” Despite moderate modification indices, item 4, “My coach provides me with positive feedback about my use of PS.” was also removed upon inspection. According to SDT, positive feedback is included in provision of structure (Markland & Tobin, 2010). However it was thought that item 4 was theoretically distinct from the other items in the subscale as it did not refer to explanation giving about PS. Following the removal of item 1, 2 and 4, explanation provision subscale model fit was good (see Table 11 and 12 for details). All of the final items from this subscale were items which had been adapted from the structure subscale of Markland & Tobin’s (2010) need support questionnaire.

Seeking athlete involvement. Item 1 “My coach asks me questions about my use of PS” and item 6 “My coach encourages me to reflect on my use of PS” had high modification indices for covariance between their error terms, and between error terms of other items. Again all items were scrutinised according to SDT which suggests that to enhance individual’s involvement coaches should be autonomy supportive which includes offering choice and acknowledging an individual’s perspective and their own reasons and values (Markland & Tobin, 2010; Silva et al., 2010). Therefore, item 1, “My coach asks me questions about my use of PS”; Item 5 “My coach and I discuss using PS” and item 6 “My coach encourages me to reflect on my use of PS” do not necessarily imply autonomy supportive coaching behaviours. For example, a coach could ask questions and discuss PS with athletes in a controlling or an autonomy supportive way, and the items do not describe seeking athlete’s autonomous involvement.

Following the removal of items 1, 5 and 6 the explanation provision subscale model fit was good (see Table 11 and 12 for details). Three of the four final items were items which had been adapted from the autonomy subscale of Markland & Tobin’s (2010) need support questionnaire.

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Table 12

Coaching of PS – Need Support, Fit statistics following revisions

CPS-NS subscales	No. of items	$S-B \chi^2_{(df)}$	RMSEA	CFI	TLI	SRMR
Explanation provision	4	3.29 ₍₂₎ ; $p = .19$	.04	.99	.99	.01
Seeking athlete involvement	4	0.78 ₍₂₎ ; $p = .68$	.00	1.00	1.00	.00
2 factor model	8	22.11 ₍₁₉₎ ; $p = .29$	.02	1.00	1.00	.01
1 factor model	8	25.36 ₍₂₀₎ ; $p = .19$	.02	0.99	0.99	.01

Note. * Indicates an unacceptable level of fit according to criteria above (Hu & Bentler, 1999)

Full Model (CPS-NS). The full model was then tested to assess the fit of the hypothesised structure of the whole scale and to highlight any poor or cross-loading items. The two factor model of the CPS-NS fit indices are displayed in Table 12, showing a good model fit according to the most stringent criteria. The intercorrelation between the two subscales was 1.0 indicating significant conceptual overlap between the subscales. We tested alternative models by carrying out the following; simulating a single factor by fixing the correlation between subscales at 1; specifying a second order model by having the two subscales loading on to a higher order factor, and testing a model with all the items loaded on to one factor. Only the latter model converged and the single factor model retained excellent model fit (see Table 12 and Table 13 for factor loadings). Consequently whilst these two constructs are theoretically distinguishable they do not appear distinguishable at a measurement level and the single factor scale was to be adopted. A single factor scale is consistent with other need support measures with the SDT literature, where different aspects of need support and need satisfaction are routinely collapsed into single scales due to high intercorrelations (e.g., Markland & Tobin, 2010).

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Table 13.

Final coaching of PS- Need Support Single Factor Scale, Item means, Standard Deviations and Factor Loadings

Items	Means	SD	Factor Loadings
<i>Single factor CPS-NS ($\alpha = .95$)</i>			
<i>Explanation Provision Items</i>			
3. My coach makes it clear what to expect from using PS	1.63	1.29	.86
9. My coach gives me good advice about PS	1.66	1.30	.89
10. My coach explains why using PS could help my performance	1.81	1.36	.88
11. My coach makes it clear what I need to do to get positive effects from using PS	1.76	1.35	.87
<i>Seeks Athlete Involvement Items</i>			
2. My coach encourages me to take my own initiative about using PS.	1.85	1.30	.79
3. My coach provides me with a range of ways to use PS.	1.64	1.34	.87
4. My coach talks to me about PS in a way which is relevant to me.	1.48	1.24	.86
7. My coach takes into account my needs when speaking with me about PS.	1.66	1.29	.86

Phase 3. Discriminant Validity

To evaluate the discriminant validity of the CPS-F and CPS-NS the differences between subgroups of participants and the Coaching of PS they received were analysed. The sample were analysed according to; (a) athlete performance levels, (b) the coaching qualification attained by their coach, and (c) amount of hours being coaching the athletes received. We hypothesised that there would be significant differences in the amount of coaching PS (both fundamental and need supportive) received by athletes of different performance levels with higher level athletes who received more time coaching reporting more coaching of PS, as the coaching of PS is more common for higher level athletes (Jedlic et al., 2007). We also

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hypothesised that there would also be significant differences between the coaching of PS delivered by coaches with different qualification levels, with coaches with higher qualifications coaching more PS (e.g., Hall et al., 2007). Furthermore, we hypothesised that there would be significant differences in the level of coaching of PS received between athletes who received different amounts of coaching, with more time spent being coached related to receiving more coaching of PS.

Athlete performance level. First, to analyse the discriminant validity of the questionnaires regarding athlete performance levels, the sample was divided into three groups. Group 1 were ‘elite-level’ athletes competing at international level or professionally; Group 2 were ‘competitive-level’ athletes competing at national, regional and British University premiere division; and Group 3 were ‘recreational level’ competing locally, in lower British University divisions and recreationally. For the CPS-F, a MANOVA revealed a significant multivariate difference between the groups, (Pillai trace = 0.056 $F(6, 860) = 4.16$, $p < .001$, partial eta squared = .028). Follow-up discriminant function analysis (DFA) revealed two functions. The first generated function – accounting for 99.3% of the total between-groups variability – revealed that athlete reports of coaching PS discriminated between elite, competitive and recreational athletes, Wilks’ $\Lambda = .94$, $\chi^2(6, n = 471) = 24.98$, $p < 0.001$. The second generated function, accounting for 0.7% of the total between-groups variability- did not discriminate between groups, Wilks’ $\Lambda_{\text{main}} = .94$, $\chi^2(2, n = 471) = .173$, $p < 0.92$. The standardized structure coefficients for the first discriminant function revealed that all three variables made a significant contribution to the discriminant function. However, coach encouragement of PS ($r = .83$) made the greatest contribution to the discriminant function, followed by targeted cueing ($r = .75$) and coach observation of PS ($r = .55$). Examination of the discriminant function at the group centroids revealed that elite level athletes (.27) reported

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most coaching of PS which discriminated them from lower performing athletes, both competitive athletes (-0.38) and recreational athletes (-.54).

For the CPS-NS, a one way ANOVA revealed a main effect for performance level ($F(4, 422) = 8.58, p < .001$, partial eta squared = .04). Post hoc comparisons using the Tukey HSD test indicated that the mean scores of coaching PS at all three performance levels were significantly different to each other, and the higher the performance level of the athlete, the more need supportive coaching of PS they received (elite athletes $M = 1.94, SD = 1.09$; competitive athletes $M = 1.65, SD = 1.14$; recreational athletes $M = 1.20, SD = .99$).

Coach qualifications. To analyse the coaching of PS delivered by coaches who had differing levels of qualifications, the sample was divided into two groups. Group 1 was comprised of athletes who were being coached by coaches qualified to level 1 or 2 (UKCC or equivalent) and group 2 was comprised those coached by level 3 or 4 qualified coaches. It is important to note that of the 471 athletes who participated, only 284 reported the qualification level of their coach (UKCC levels or equivalent) of which, 11% of coaches were level 4 qualified, 27.4% level 3, 18.0% level 2 and 3.8% were level 1 qualified. For the CPS-F, the MANOVA did not reveal a significant multivariate difference between the groups, (Pillai trace= 0.023 $F(3, 278) = 2.16, p = .09$, partial $\eta^2 = .023$). Also for the CPS-NS the one way ANOVA revealed no significant differences between level of coach qualification and the coaching of PS ($F(1, 278) 1.09, p = .27$).

Coaching time received by athletes. Finally, to analyse whether there were significant differences in coaching of PS received by athletes who had different amounts of coaching, we divided the sample into four groups. Group 1 were athletes who received more than 25 hours coaching a month (more than five hours a week); Group 2 received 15-25 hours coaching a month (approx. four -five hours a week); Group 3 received 5-15 hours coaching a month (approx. two-three hours a week); Group 4 received 1-5 hours per month

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(approx. one hour a week). For the CPS-F, the MANOVA did not reveal any a significant multivariate differences between the groups, (Pillai trace = 0.019 $F(9, 1359) = .97, p < .47$, partial $\eta^2 .006$). For CPS-NS a one way ANOVA revealed no significant differences between hours of coaching received and the coaching of PS ($F(3, 445) 1.51, p = .21$).

Discussion

The four factors hypothesised to underlie the fundamental coaching of PS were: coach observation of PS, coach instructing of PS, coach reinforcement of PS and targeted cueing of PS. Following confirmatory factor analysis and theoretical scrutiny, it became clear that coach instructing and reinforcing of PS were part of the same construct of coach encouragement. It was thought that in order to reinforce or remind PS use, a coach is likely to have also instructed his/her athletes about PS. Therefore reinforcement and instructing were combined to create a single factor. Subsequently a three factor model (observation, targeted cueing, encouragement) was adopted and a good model fit was obtained.

The CPS-NS was designed to provide an indication of the quality of coaching PS rather than the frequency, and was informed by interview analysis (Study 2) and SDT theory surrounding need support. SDT theorists suggest that providing need support (whilst coaching PS in this instance) involves helping individuals to develop clear expectations (Markland & Tobin, 2010) and explaining behaviour-outcome contingencies (Silva et al., 2010), whilst minimising pressure, offering choice and acknowledging an individual's perspective (Markland & Tobin, 2010; Silva et al., 2010). The factor analyses yielded a single factor measurement model including explanation giving and seeking athlete involvement. A single factor structure corresponds to the findings of similar measures of need support (Markland & Tobin, 2010) suggesting that different aspects of need support such as autonomy and structure are highly inter-related.

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With regards to discriminant validity, the results of the analysis suggested that the levels of coaching of PS athletes reported by the CPS-F and CPS-NS differed depending on the performance level of the athletes. Specifically, the elite level athletes reported receiving significantly more coaching of PS, in comparison to competitive, or recreational level athletes. This supports the findings of previous research which suggests that the coaching of PS is more common for higher level athletes (Jedlic et al., 2007). This finding is possibly a result of coaches perceiving that there are less technical gains to be made at higher skill levels, and thus the coaching of PS becomes more of a priority. Conversely, there were no differences between the level of coach qualification and athlete reports of both fundamental and need supportive coaching of PS. The lack of differences between coaches of different qualification levels and coaching of PS has been found in other research (Hall et al., 2007) and could be due to limited coverage of coaching PS within current qualification training along with the limited effectiveness of coaching PS education (Gilbert & Trudel, 2010).

Finally, there were no differences between coaching time the athletes received and levels of coaching PS. The absence of a relationship between coaching time and the coaching of PS might seem counterintuitive, as a lack of coaching time has previously been reported as a common barrier to the coaching of PS (Gould et al., 1999). However, the results in this study combined with findings in Chapter 2 could imply that rather than a lack of coaching time preventing coaching PS, perhaps the more significant barrier is coaches' not allocating sufficient coaching time to coaching PS.

As a result of this study, two factorially valid questionnaires have been created in order to accurately measure the coaching of PS. The results of the current study also show that both questionnaires have discriminant validity. In order to confirm the questionnaires appropriateness of use in the Chapter 4, there concurrent and predictive validity of the inventories were investigated in Study 4.

Study 4

There were two objectives to Study 4. First, we evaluated the concurrent validity of the CPS-F and CPS-NS in relation to a conceptually related measure, and second we examined the predictive validity of each scale in relation to athlete awareness of their PS use.

Concurrent Validity

Concurrent validity of the CPS-F and CPS-NS were examined by drawing upon a concept related to the coaching of PS; the coaching of mental preparation. A key purpose of PS training or the coaching of PS is assisting athletes with their mental preparation (Weinberg & Williams, 2010). Therefore, we conducted correlations between a measure of coaching mental preparation (The Coaching Behaviour Scale for Sport) and athlete reports on the subscales of the CPS-F and the CPS-NS. The Coaching Behaviour Scale for Sport (CBS-S; Côté et al., 1999) includes a subscale which measures the frequency of coaching about mental preparation along with subscales measuring; physical training and planning, goal setting, competition strategies, technical skills, personal rapport and negative rapport. The behaviours measured by the CBS-S have been shown to be related to athlete anxiety (Baker, Côté, & Hawes, 2000) and athlete use of coping strategies (Nicolas, Gaudreau, & Franche, 2011). For the purposes of this study only the mental preparation subscale was used. This subscale measures coach provision of advice on mental preparation (e.g., My coach provides advice on how to perform under pressure). We hypothesised that all subscales measured by the CPS-F and CPS-NS would be significantly correlated with athletes' ratings of coaching of mental preparation on the CBS-S.

Predictive Validity

Within Study 1 (Chapter 2), coaches and athletes reported that the coaching of PS improved athletes' awareness of what PS were and how they could be used. As such, assessing the predictive validity of the CPS-F and CPS-NS via correlations between the

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coaching of PS and athletes' awareness of PS was highly relevant. Awareness of PS use is readily mentioned in applied sport psychology literature (e.g., Ravizza, 2010) but has not been empirically measured in sport research. However, within educational research, the concept of metacognition, an 'awareness and management of one's own thought (Kuhn & Dean, 2004, p.270)' has been investigated in some depth. Metacognition is thought to be made up of a multidimensional set of cognitive skills, much like PS referred to in sport (Hennessey, 1999). It has been suggested that these metacognitive skills assist to monitor and regulate cognitive processes involved in learning and are empirically distinct from general intelligence (Schraw, 1998). Schraw and Dennison (1994) suggested that metacognitive awareness was made up of an individual's knowledge of his or her own cognition (declarative, conditional and procedural knowledge) and regulation of cognition (planning, information management, monitoring, debugging and evaluation). For the purposes of this study, we were interested in athlete's knowledge of their PS use as a form of awareness. The three types of knowledge as measured by the Mental Awareness Inventory (MAI) can be defined as; procedural knowledge of cognition, which refers to knowledge about how to implement mental strategies: declarative knowledge of cognition, which refers to knowledge of one's skill and ability to use PS; and conditional knowledge of cognition, which refers to knowledge about when and why to use PS. The three aspects of metacognitive knowledge are affected by the learning environment an individual is in (Schraw & Dennison, 1994) and in the current context the effective and regular coaching of PS should increase athletes' knowledge about their own use PS and the effective application of PS. Therefore, hypothesised that all subscales of the CPS-F and the CPS-NS would be correlated with all subscales of the MAI.

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Method

Participants. A proportion of the athletes included in Study 3 completed additional measures to analyse the concurrent and predictive validity of the questionnaire measures. All the participants were over the age of 14, received regular coaching and were actively competing in sport(s). A total of 193 athletes agreed to participate in the study (M age = 18.1 \pm 3.8, n = 114 male, n = 79 female). At the time of data collection athletes in the sample had been participating in 15 different sports for an average of 7.7 (\pm 4.3 years). Of the participants 2.1% were competing professionally, 29.2% internationally, 42.6% nationally, 10.3% regionally, 6.6% in British Universities Leagues, and 6.7% recreationally. All athletes included in the sample stated that they were receiving regular coaching, 29.7% received more than 25 hours of coaching a month, 29.4 % between 15-25 hours, 17.4% between 5-10 hours, 10.8% between 1-5 hours a month. The data collection procedure was as described in Study 3.

Measures.

Coaching of PS- Fundamentals (CPS-F). The Coaching of PS- Fundamentals (CPS-F) was made up of 13 items, split into three factors of Coaching PS behaviour (Observation of PS, Targeted cueing of PS and Encouragement of PS use). Study 3 confirmed the factor structure of the questionnaire and each subscale revealed good internal consistency. There were four versions of the questionnaire, each of which referred to a different psychological skill (goal setting n = 24, imagery n = 62 , relaxation n = 84 and self-talk n = 27). Participants were requested to complete one of the four versions at random and were asked to rate how frequently the situations occur a 5-point scale (0 = never; 1 = rarely; 2 = sometimes; 3 = often; 4 = Always).

Coaching of PS-Need Support (CPS-NS). The CPS-NS was a single factor scale, measuring explanation giving (4 items) and seeking athlete involvement (4 items). Study 3 established the single factor structure of the questionnaire and revealed good internal

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consistency. Again, there were four versions of the questionnaire, which was applied to each of the psychological skill choices (goal setting, imagery, relaxation, self-talk). Participants were randomly requested to complete one of the four versions and asked to rate their experiences on a 5-point scale (0= *Not at all true of me*, 4= *Very true of me*).

Coach Behaviour Scale for Sport (CBS-S). The CBS-S (Côté, Yardley, Hay, Sedgwick, & Baker, 1999) mental preparation subscale included five items which examined coaching behaviour to help athletes mentally prepare for their sport (e.g., My coach provides advice on how to perform under pressure). Athletes scored all items on 1-7 Likert-type scale (1-*Never*, 2- *Very rarely*, 3-*Rarely*, 4-*Fairly often*, 5- *Often*, 6-*Very Often*, 7-*Always*). The factor structure of the CBS-S has been confirmed in various studies (Côté et al., 1999; Stevens, Baker & Côté, 2006). In the current study, the CBS-S revealed good internal consistency, $\alpha = .91$.

Metacognitive Awareness Inventory (MAI). The MAI (Schraw & Dennison, 1994) subscale measuring an individual's knowledge of his or her own cognition (declarative, conditional and procedural knowledge) was adapted to apply to a sports context (E.g., *I am aware of what strategies I use when I study* was adapted to *I am of what mental strategies I use when I play sport*). Each item was rated against a 100mm, bipolar scale, the right end labelled *true* and the left end *false*, and participants recorded their responses by drawing a line across the scale at the point which corresponded to how true or false the statement was about them. Previous factorial analyses have been conducted on both the MAI (Schraw & Dennison, 1994) and Junior. MAI (Sperling, Howard, Miller & Murphy, 2002) suggesting variable model fit. Therefore factorial analyses using a sequential approach were conducted on the adapted questionnaire MAI for the purposes of the current study. Firstly convergent validity of the items within each subscale was tested using separate single-factor models, then items were removed guided by diagnostic information from the single factor models and

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conceptual arguments and then the full-model was tested. A three factor model (declarative, conditional and procedural knowledge) with 12 items displayed adequate fit (S-B χ^2 (51) = 102.26, $p < .000$; RMSEA = 0.053; CFI = 0.95; TLI = 0.94; SRMR = 0.04). In the current study, the MAI subscales revealed adequate internal consistency (procedural knowledge $\alpha = .77$, declarative knowledge $\alpha = .71$, conditional knowledge $\alpha = .64$). A copy of the questionnaire can be found in Appendix G.

Data Analysis

The concurrent validity of the CPS-F and CPS-NS were examined via bivariate correlations between MAI scores and scores on the CPS-F and CPS-NS. The predictive validity of the CPS-F and CPS-NS were also examined via bivariate correlations between MAI scores and scores on the CPS-F and CPS-NS.

Results

Concurrent Validity. The bivariate correlations revealed that CPS-F factors of observation, targeted cueing and encouragement and the CPS-NS were all significantly correlated with coaching mental preparation as measured by the CBS-S (See Table 14). The CPS-F subscales of targeted cueing showed the lowest correlations with coaching mental preparation, followed by coach observation of PS, all of the correlations ranged between .40 and .51 and were significant to $p < 0.001$.

Predictive Validity. The bivariate correlations revealed that all factors of the CPS-F and CPS-NS were significantly correlated with procedural, declarative and conditional knowledge of mental strategies or PS (See Table 14). The athlete reports on the CPS-NS had higher correlations with all types of athlete knowledge (procedural knowledge .22; declarative knowledge .29

Table 14

Means, Standard Deviations and Bivariate Correlations between CPS-F, CSP-NS, CBS-S and MAI subscales.

Scale	Subscale	Mean	SD	1	2	3	4	5	6	7
CPS-F	1. Observation	1.28	1.04							
CPS-F	2. Targeted Cueing	2.21	1.29	.63**						
CPS-F	3. Encouragement	1.54	1.15	.87**	.61**					
CPS-NS	4. Need Supportive coaching of PS	1.74	1.16	.83**	.62**	.86**				
CBS-S	5. Mental Preparation	4.89	1.41	.46**	.40**	.48**	.51**			
MAI	6. Procedural Knowledge	65.21	19.44	.20**	.22**	.15**	.22**	.14*		
MAI	7. Declarative Knowledge	61.20	18.13	.27**	.16**	.24**	.29**	.17*	.39**	
MAI	8. Conditional Knowledge	62.57	18.00	.30**	.21**	.26**	.34**	.30**	.63**	.42**

Note. N= 187, ** correlation is significant $p < .001$, * correlation is significant $p < .01$, variables 1 to 3 were rated on a 1-5 scale, variables 4 and 5 were rated on a 0-4 scale. variable 6 was rated on a 1-7 scale and variable 7, 8 and 9 were rated on a 1-100 scale.

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and conditional knowledge .34) than athlete reports on the CPS-F.

Discussion

Study 4 examined the concurrent and predictive validity of the CPS-F and CPS-NS scales. Concurrent validity was demonstrated by all subscales of the CPS-F and the CPS-NS being significantly correlated with a measure of coaching of mental preparation (the CBS-S; Côté et al., 1999). The coaching of PS scales (CPS-F and CPS-NS) measured coaching athletes to use mental strategies and the CBS-S subscale of mental preparation measured the provision of coach advice on matters such as; performing under pressure, being mental tough, and staying positive. As hypothesised, athletes' reports of coaching PS and coaching mental preparation were correlated suggesting that the CPS-F and CPS-NS measure athlete reports of the coaching of PS as intended.

As an indication of predictive validity and as hypothesised, all factors of the CPS-F and the CPS-NS were significantly correlated with procedural, declarative and conditional knowledge of mental strategies, as measured by the MAI. This result shows that athletes ratings of how much their coach observes their PS use, provides cues, encourages them to use PS and provides them with needs support regarding PS is related to athletes ratings of their knowledge of about: how to implement mental strategies; their skill and ability to use PS; and when and why to use PS. The correlations between the variables although significant were relatively small. The size of correlations are likely to have been due to the fact that most of the coaches in the sample are unlikely to have been trained in how to coach PS effectively, therefore they were not be expected to have a large impact on athletes awareness of PS. Unfortunately, the cross sectional design on this study, negated any time lapsed predictive validity and a longitudinal design would have been preferable in this instance.

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Chapter summary

The purpose of present set of studies was to develop reliable and valid measures of Coaching PS for use in the subsequent intervention within Chapter 4. Taken together the results of the three studies provide support for the validity and reliability of the scores on the CPS-F and CPS-NS. Specifically, Studies 2 and 3 demonstrated that the 13 item CPS-F measuring the fundamentals of coaching PS (Observation of PS, Targeted cueing of PS and Encouragement of PS use) and the 8 item CPS-NS measuring the need supportive coaching of PS (explanation giving and seeking athlete involvement) had a conceptually meaningful factor structure. The scales also demonstrated good internal consistency. Study 3 also demonstrated that the CPS-F and CPS-NS evidenced some discriminant validity, as both CPS-F and CPS-NS results discriminated between athletes of different performance levels as they received different levels of coaching PS. However, the CPS-F and CPS-NS did not discriminate between the level of coach qualification held by the coach in question and the coaching time received by the athletes. The lack of difference between coaching qualifications and time relative to the coaching PS reported could indicate that these factors do not influence the coaching of PS as much as originally thought.

There are however, some limitations to the current research. Given that the athletes were nested within groups of coaches, one might argue it would be optimal to either model for or control for any group level variance in the data. However, the majority of the current sample were made up of single athletes being coached by different coaches, which resulted in many groups with an n of 1, making multi-level analysis inappropriate (Hox, 2010). It would have also been a useful addition to test for invariance in the measure across each of the four PS. However, the numbers of athletes completing the measures in relation to each PS precluded any invariance testing. Although, from a theoretical perspective, there is no reason to expect that the factor structure of each measure would differ across PS, being able to

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confirm this would have been a strength in the current set of studies. Another weakness of the research was that the same athletes completed all measures at the same time, increasing the likelihood of common method variance affecting their reports. Indeed, the research would have benefitted from a longitudinal design with athletes completing the CPS-F and CPS-NS on a date prior to the concurrent and predictive validity measures; however this was not possible due to limited resources and access to an elite sample.

Despite the weaknesses of the current research, the questionnaires developed offers a significant improvement to the previous questionnaires, such as the CEPS (study 1) and other coaching of mental skill measures (e.g., Paquette & Sullivan, 2012). The CPS-F and CPS-NS allow for an assessment of frequency and quality of different coaching PS behaviours and as such differential predictions about their relationship to athlete PS use and other outcomes can be made. Further, these measures are thought appropriate for the subsequent large-scale intervention study in Chapter 4 and will assist to improve the quality of subsequent PS research.

Implications

The purpose of the present PhD research programme was to provide an example of a rigorous approach to the implementation and evaluation of a sport psychology intervention. The research within the current chapter created two valid measures of coaching of PS (measuring the frequency and quality of coaching PS) which significantly improves the rigour of the intervention evaluation in Chapter 4. Specifically, the creation of a valid measure of coaching PS behaviour has enhanced the accuracy of coach behaviour change measurement. Furthermore, the model of coaching PS behaviour which has been developed in the current chapter (coach observation, targeted cueing, encouragement and needs support) informed the information delivered to coaches within the full-scale intervention in Chapter 4. Indeed, coaches were taught about the four types of coaching PS behaviours and how they

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could adopt them within their coaching. The current chapter therefore assists in the creation of an effective format for coach intervention to optimise coach provision of PS support for athletes.

Chapter 4

The evaluation of a complex coach behaviour change intervention for the coaching of PS

Chapter 4

Abstract

A quasi-experimental longitudinal study was employed to compare a need-supportive coaching PS mentoring intervention (MI) to standardised PS workshops (WI). The intervention implementation and evaluation was guided by the MRC guidelines (Craig et al., 2008) and the Chapter 2 findings. The WI provided PS information via pre-recorded PS workshops, whereas the MI delivery was designed according to the intervention model created in Chapter 2. Coaches participating in the intervention were matched and allocated to groups according to location (MI = 13 coaches; WI= 12 coaches; *M years experience coaching* = 16.09). 179 athletes who received coaching participated (*M age* = 16.7).

Via a mixed method evaluation using coach, athlete and informant data, the results revealed that both interventions created positive coach and athlete outcomes. Following the intervention MI coaches increased their encouragement of PS and need supportive coaching of PS to a greater extent than WI group. Athletes of MI coaches had greater athlete awareness of PS. Also the coaching of PS indirectly improved athlete performance via athlete awareness of PS, athlete use of PS and athlete training.

A process evaluation revealed that the MI was more need supportive than the WI, however the WI was more supportive than intended. The need support provided was shown to be related to coach need satisfaction, coach beliefs about PS and coach intentions to coach PS. The MI impacted more effectively on the components of coach change than the WI, creating higher levels of: discrepancies, competence of coaching PS, belief in the importance of PS, less negative concerns about coaching PS and greater procedural knowledge to coach PS. This study highlights the benefits of intervention piloting and designing need supportive intervention delivery to specifically tackle the barriers to coach behaviour change.

Chapter 4

The current thesis uses the Medical Research Council (MRC) guidelines for complex interventions (Craig et al., 2008) to enhance the quality of coach intervention research. The guidelines were used to develop an effective coaching PS intervention through pilot testing (Chapter 2) and measurement development (Chapter 3). Chapter 2 reported a longitudinal pilot study of a coaching PS mentoring programme based on SDT principles (Ryan & Deci, 2002). The pilot study results revealed that the intervention supported coaches' needs (Markland & Tobin, 2010), and that levels of need support impacted on coach behaviour change regarding PS. The intervention also impacted positively on some athletes' use of PS and training behaviours, via the increased coaching of PS and subsequent increased athlete awareness of PS. Whilst the pilot study provided important insights, its evaluation had limitations similar to those of previous coach PS interventions (Hall et al., 2007; Hall & Rodgers, 1989; Harwood, 2008) with a small sample size ($n = 8$ coaches), no control group and limited athlete data due to large-scale athlete attrition. Therefore, a larger scale, more rigorous intervention was needed to adequately assess the effectiveness of a need supportive coaching PS intervention.

In order to improve the efficacy and evaluation of the current intervention, in Chapter 2 an intervention process model (e.g., Hardeman et al., 2005) was created. The model describes the active ingredients influencing the coaching of PS in order to identify the required facilitation and evaluation in the subsequent intervention design. The intervention model (Figure 1, Chapter 2) included: coach understanding of PS, coach need satisfaction, coach self-discrepancies, and coach beliefs regarding PS, coach intentions to coach PS and coach procedural knowledge. The pilot study and the intervention model highlighted the need for several methodological improvements regarding the intervention delivery, data collection and measurement for subsequent larger-scale interventions. For example, some coaches

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would have benefitted from more structure (Markland & Tobin, 2010) in the form of clearer explanations of the intervention, assistance to plan the coaching of PS and more feedback.

Improvements to the measurement of behaviour change (the coaching of PS) were required in order to capture a broader range of coaching PS behaviours and as such new measures were developed and validated in Chapter 3. Additionally, athletes' ratings of their PS use on the Test of Performance Strategies (TOPS; Hardy et al., 2010) were thought to be inaccurate due to the athletes' lack of understanding regarding their own PS use at the start of the intervention (cf. Woodcock et al., 2010 for similar findings). Therefore, for the current investigation we decided that athlete awareness of PS use should be measured as a primary outcome and athlete PS was a secondary, subsequent outcome.

To assist researchers with complex intervention implementation and evaluation, the MRC guidelines (Craig et al., 2008) make a number of recommendations. The guidelines state that the key to evaluating a complex intervention is establishing whether an intervention is effective in everyday practice. They propose that in order to establish the practical value of an intervention, the proposed intervention should be compared against a control group, and where possible a randomised design should be adopted. Furthermore, to understand the value-added by a novel intervention in real terms, an intervention should be compared against 'usual practice' rather than non-treatment or placebo controls (Craig et al., 2008). The guidelines also suggest that to truly assess an intervention's practical effectiveness, it is important to use a mixed method approach to compare interventions and understand the whole range of **outcomes** between contexts and over time (*for both the short-term and long-term*), including any unintended outcomes. Indeed, using a combination of qualitative and quantitative data can enrich the study findings, allowing statistical comparisons of data whilst obtaining an in-depth understanding of participants' experiences. As well as evaluating practical outcomes, to enable the design of more effective interventions, the guidelines

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maintain the importance of evaluating the intervention **process** to assess the intervention implementation and clarify causal mechanisms influencing outcomes (Craig et al., 2008). Additionally to prioritise intervention effectiveness within the intervention process, the guidelines suggest adapting interventions to work in specific settings to ensure they are practically viable rather than using inflexible intervention protocols.

Based on the findings of the pilot study and the recommendations from the MRC guidelines, we designed the current intervention in order to evaluate the practical effectiveness of a need supportive PS intervention. We adopted a longitudinal, mixed methods design in order to compare the intervention **processes** and **outcomes** of a need supportive coaching PS intervention to a ‘usual practice’ intervention control group. This study was the first to directly compare the effectiveness of different types of coach education interventions on coach behaviour change, which will assist the design of more effective coach interventions in the future.

So-called ‘usual practice’ regarding coaching PS interventions has generally been in a workshop format; short one to two-hour information providing events with informative booklets (e.g., Callow et al., 2010, Study 1; Edwards et al., 2012; Harwood, 2008) and delivering this type of coach workshop online is increasingly common (Montelpare et al., 2010; National Soccer Coaches Association of America, 2014). Indeed, online delivery of workshops can mimic onsite delivery, but offers a more flexible mode of delivery and a resource for continued referral rather than simply a ‘one off experience’ (Liaw, 2008). Therefore, the usual practice control group were given an online workshop intervention (WI) delivered by a trained programme facilitator (PF; the first author and PhD student trained in applied sport psychology practice). The WI was designed to deliver the key information to coaches about coaching PS via pre-recorded workshop videos and information booklets.

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The need supportive coaching PS intervention was a mentoring intervention (MI) which was delivered in one to one sessions (see Table 16) with the same trained PF as the WI. The MI was specifically designed to impact on each component of the intervention model using research-informed intervention activities to facilitate coach behaviour change. Within the model, coach need satisfaction regarding the coaching of PS was considered to be an overarching facilitator of coach behaviour change throughout the MI (Markland & Tobin, 2010; Reeve et al., 2004). As such the intervention was designed to provide coaches with need support in the form of autonomy (choices and relevant rationale regarding PS), structure (clear explanations and positive feedback about their coaching of PS), mastery experiences of using PS and coaching PS with athletes (Bandura, 1997) and interpersonal involvement (unconditional positive regard and a long-term supportive relationship) in order to satisfy their basic needs and make the coaching of PS more likely. As suggested by the MRC guidelines, rather than using a rigid protocol, the specific PS content was individualised for each coach based on their needs related to the coaching of PS.

As noted in the intervention model (see Figure 1) alongside coach need satisfaction, the key factors influencing coach behaviour change were, (a) coach understanding, (b) coach discrepancies, (c) coach beliefs regarding the coaching of PS, (d) intentions to coach PS, and (e) procedural knowledge of coaching PS. The model described that as the initial part of the MI, coaches needed to accurately understand what PS were in order to contemplate changing their coaching to include more PS (Weinstein, 1988; Gould, et al., 1999). Therefore, the MI was designed to ensure coaches understood PS as strategies which could be taught to and learnt by athletes, by providing them with specific PS information and then verifying coach understanding at the start of the MI. In addition, the preferred learning style of the coach was established at the start of the intervention, to enable the PF to tailor subsequent learning activities for each coach. Once an understanding of PS had been gained, coach awareness of

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self-discrepancies between the coaches' current coaching and ideal coaching including of PS were likely facilitators of coach behaviour change (cf. Higgins, 1987). Discrepancies were found to be a factor influencing behaviour change in Chapter 2. Indeed reflection or challenge has been broadly recognised as a key step towards for behavioural change within performance contexts (e.g., Arthur, Hardy & Woodman, 2012; Butler & Hardy, 1992; Whitmore, 2000; Gilbert & Trudel, 2005). Therefore, the MI was designed to elicit coach discrepancies by a process of coach profiling (e.g., Butler & Hardy, 1992) in order to assist coaches to identify occasions when they do not engage in the coaching of PS. Further, coaches' beliefs about the value of coaching PS were also thought to influence their subsequent behaviour change by impacting on coaches' intentions to coach PS (Schwarzer, 2008, Ajzen, 1991). Specifically, as outlined with the Theory of Planned Behaviour (Ajzen, 1991) and the Transcontextual Model (Hagger et al., 2003) coach beliefs included coach attitudes towards PS (e.g., believing that the coaching of PS would be beneficial to athletes), perceived control (e.g., I can decide whether I coach PS) and subjective norms (e.g., athletes and other coaches would want me to coach PS). Coach beliefs were specifically targeted during the MI by making the information regarding positive outcomes of PS explicit and persuasive (Michie et al., 2008), by addressing any coach concerns regarding negative outcomes or norms surrounding coaching PS and by facilitating coaches to have positive experiences of PS. To further encourage positive beliefs regarding the coaching of PS, principles from motivational interviewing were adopted. The motivational techniques allowed the PF to be non-judgemental in the light of coaches concerns or negative attitudes towards PS and to then assist the coach to clarify and enhance any positive attitudes (Miller & Rollnick, 2002). Following the targeting of beliefs to teach PS, the next stage of the process involved ensuring that coaches had sufficient procedural knowledge (knowledge of how to coach PS effectively) to initiate and then sustain the coaching of PS. Therefore,

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during the MI coaches were assisted to develop and confirm their procedural knowledge via experiential learning activities and the creation of explicit procedural plans to coach PS (i.e., when, where, how to conduct coaching PS; Michie et al., 2008; Schwarzer, 2008; Gollwitzer, 1999). In summary, the MI was intended to be a need supportive, experiential learning process which would increase the coaching PS over time. Furthermore, the coaches who received the MI were expected to effectively impact on their athletes' use of PS over time.

Despite a randomised design being favourable, due to ethical reasons and the practicalities of intervention implementation in an elite and hard to reach sample, it was not possible to implement a randomised-clustered controlled trial and coaches were allocated groups based on their location. However, to maximise the quality of such a quasi-experimental design, participating coaches were matched on a number of demographic and contextual variables (see method) and all coaches and athletes were blind to the study hypotheses.

Alongside comparing the outcomes between groups, we also assessed the impact of coaching PS. Indeed, alongside a dearth of rigorous assessment of coaching PS interventions in the literature, there is also a paucity of research regarding how the coaching of PS impacts on athlete outcomes. Applied sport psychology literature suggests that encouraging the development of athlete awareness is a pivotal first step towards to improving athletes use PS (Burton & Raedke, 2008; Vealey, 2007). Indeed, the qualitative analysis of the pilot study suggested that the coaching of PS improved some athletes' awareness and use of PS. Further to this, given the time spent in training contexts coupled with the impact of training on athletic performance (McCann, 1995; Ericsson, 1990) it is noteworthy that the use of PS in training has been shown to improve athlete training behaviours (Woodman, Zourbanos, Hardy, Beattie & McQuillan., 2010), particularly the quality of athlete's preparation. These effects are likely a result of improved focus (e.g., Calmels, Berthoumieux, & d'Arripe-

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Longueville, 2004), effort (Oliver et al., 2010), and ability to cope with setbacks (Hardy et al., 1996). Enhanced effort and coping in training should then result in improved athletic performances (Nicholls, Polman, & Levy, 2012). Therefore, it was expected that the coaching of PS would impact on performance indirectly via increases in athletes' awareness of PS use, which would subsequently improve athletes' PS use, leading to enhanced effort ability to cope with setbacks in training.

The purpose of the current study was three fold, (a) to assess the practical effectiveness of a need supportive MI according to primary and unintended outcomes, (b) to verify the impact of specific coaching PS on athlete outcomes, and (c) to assess the intervention process experienced by the coaches.

We collected data from multiple sources at pre-test, mid-test, post-test and follow-up data points with the intention of understanding the **intervention outcomes, the impact of coaching PS and intervention processes** from various perspectives. In order to understand intervention effectiveness, the intervention **outcomes** were the *intended outcomes* of (a) the increased coaching of PS, (b) the increased athlete awareness of PS and, (c) the relationship between each coaching PS behaviour and athlete performance (via athlete awareness of PS, athlete use of PS and athlete training behaviour). Also the *unintended outcomes* created by the intervention were revealed via the qualitative analysis.

The **intervention processes** were investigated to establish whether the interventions (WI and MI) were delivered as intended and to verify how each intervention facilitated or prevented coach change according to the intervention model. The **intervention processes** were assessed regarding coaches perceptions of their *intervention experiences* of (a) intervention format, (b) intervention content, and (c) the nature of intervention delivery including need support. The facilitation of *active ingredients of the intervention model* (coach context, coach understanding of PS, coach discrepancies of PS, coach beliefs regarding PS,

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coach intentions to coach PS and coach procedural knowledge) and their relationship to coaching of PS was also assessed.

In summary, for the **intervention outcomes**, we hypothesised that the MI group coaches would increase the coaching of PS to a greater extent than the WI group due to the facilitative nature of the MI. Furthermore, athletes in the MI group would increase their awareness of PS to a greater extent than the online group due to the more regular and effective coaching of PS conducted by the MI group. Regarding the impact of coaching PS behaviours, it was expected that coaching PS would impact on athlete performance indirectly. Based on the rationale presented earlier we hypothesised that a serial indirect effect (cf. Hayes, 2013) would be present where coach PS behaviours would influence athlete awareness of PS use, in turn increasing athlete PS use in training, with the increased use of PS in training positively influencing athlete training behaviours (effort in training and coping with setbacks) to improve performance (See Figure 3). We also expected that the intervention would create *some unintended outcomes* which would be detected via qualitative analysis of the coach follow-up interviews.

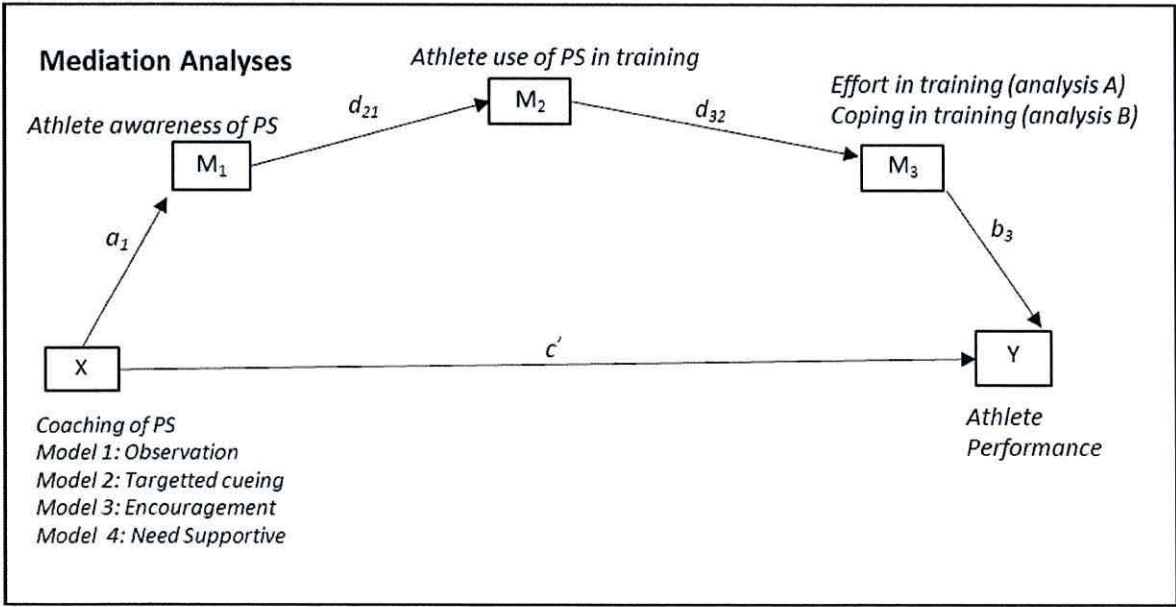


Figure 3. Diagram of mediational models for analysis

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For the **intervention process**, we hypothesised that the MI group coaches would have more *positive intervention experiences* and perceive the programme as more need supportive than the online group. As the model suggests, due to the facilitative nature of the MI, we expected coaches in the MI group to be significantly higher on all of the *active ingredients in the intervention model* (coach understanding of PS, coach awareness of discrepancies, coach need satisfaction, positive attitudes towards PS, coach intention to coach PS and coach procedural knowledge). Furthermore, we hypothesised that all of the components of the intervention model (coach understanding of PS, coach awareness of discrepancies, coach need satisfaction, positive attitudes towards PS, coach intention to coach PS and coach procedural knowledge) would be positively related to the coaching of PS. Finally, we expected that any additional barriers or facilitators to coach behaviour change would be detected via analysis of the coach follow-up interviews.

Method

Participants.

Coaches. Figure 4 displays the study flow chart of participant numbers throughout the intervention process. Following coach recruitment, 25 elite coaches agreed to participate in the intervention (n females = 2, n males = 23; M years experience coaching = 16.09, SD = 12.09; M age = 44.1, SD = 13.3). All coaches were regularly coaching actively competitive athletes, aged 14 years and over, in three specific regions of the UK. The coaches worked in a range of individual and pair-based sports (athletics, badminton, canoeing, golf, sailing, swimming, and table-tennis) and had coaching qualifications of UKCC or equivalent (n = 5 level four; n = 10 level three; n = 8 level two; n = 2 level one). Fourteen coaches were paid and eleven were volunteers. Five of the coaches had completed Sport Science degrees and two of the coaches had previous experiences of working with a Sport Psychologist on a regular basis.

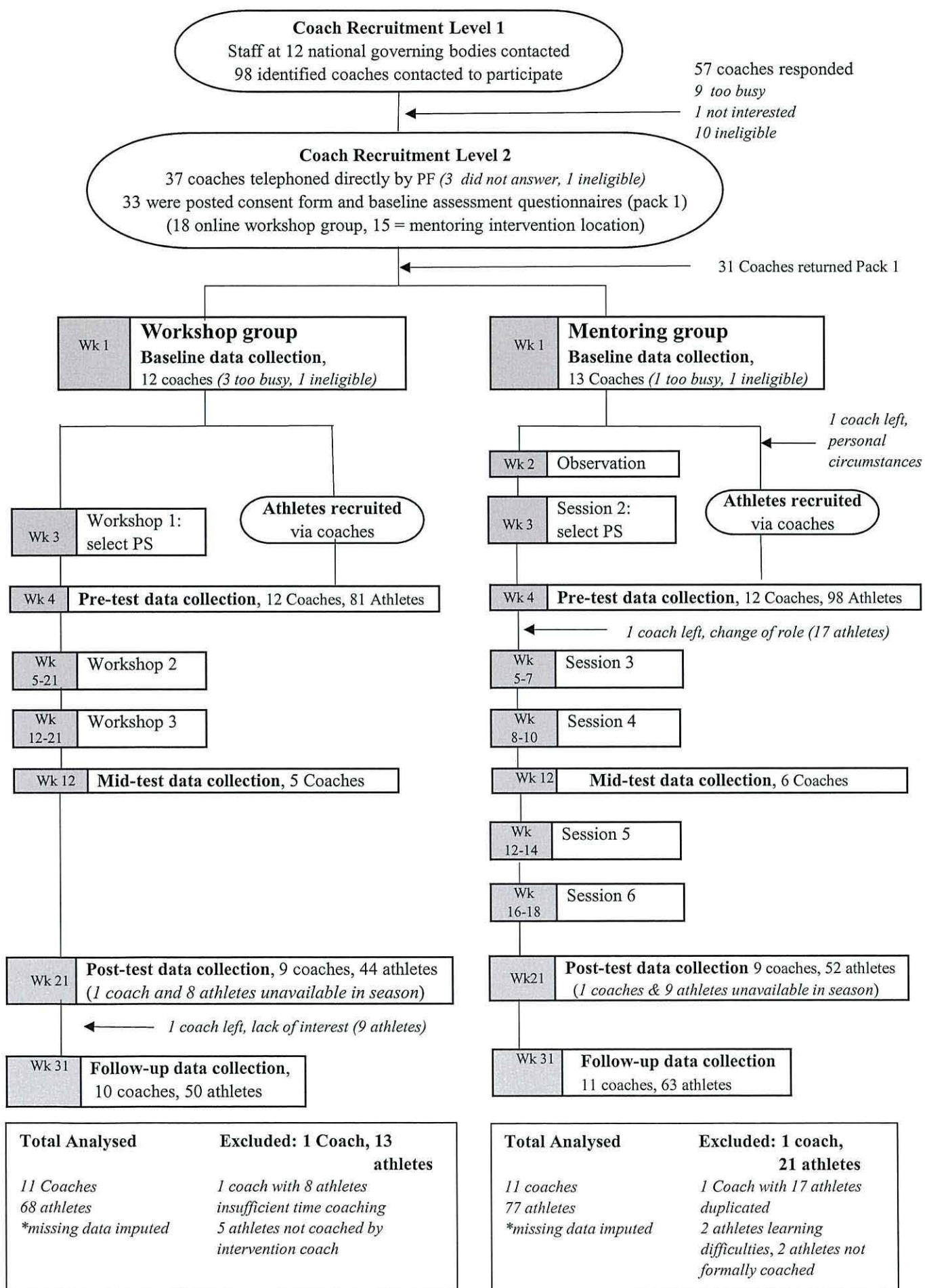


Figure 4. Intervention participant flowchart

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As part of the recruitment process, each coach assigned to the MI group was paired with a matched coach of a similar background in the WI group. The coaches were matched as closely as possible for type of sport, level of athletes and experience of the coach. Between group chi-squared tests on coach demographics suggested that the matching was successful as the groups did not differ significantly on; coaching qualification level, $\chi^2(3) = 1.37, p = .71$, performance level of athletes coached $\chi^2(4) = 3.27, p = .51$, previous education in sport psychology $\chi^2(3) = 4.13, p = .24$ and previous work with a sport psychologist $\chi^2(3) = 3.71, p = .16$. Also a between group *t*-test showed that coaches did not differ significantly on their levels autonomous motivation to participate (see Appendix E for details) in the programme, ($t(19) = 1.68, p = .11$).

Athletes. Coaches were asked to recruit the athletes they coached to take part in questionnaire completion ($M = 6.88$ athletes recruited per coach). As can be seen in Figure 4, a total of 179 athletes agreed to participate in the study (M age = 16.7, $SD = 7.34, n = 94$ male, $n = 85$ female). The athletes recruited competed predominantly at an international or national level (29.6% international or professional, 49.7% national, 13.4% regional, 3.4% club/recreational, 3.9% did not report performance level). Informed consent was obtained prior to participation in the study by the PF, and parental consent was obtained for any athletes under 16.

Measures. A series of measures were completed across five time points, as can be seen in Table 15.

Intervention Outcomes.

Coaching of PS- fundamentals (CPS-F). The Coaching of PS- Fundamentals Questionnaire (CPS-F) comprised 13 items, split into three factors of Coaching PS behaviour (Observation of PS, Targeted cueing of PS and Encouragement of PS use). The CPS-F was designed to measure the coaching of the specific PS developed during the intervention

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Table 15. *Outcome and process measures*

Evaluation measure	Data	Reporter	Baseline (coach only)	Pre-test	Mid-test (coach only)	Post-test	Follow- up
Outcome evaluation							
Coaching of PS-Fundamentals (CPS-F).	Questionnaire	Athlete		X		X	X
Coaching of PS-Need Support (CPS-NS).	Questionnaire	Athlete		X		X	X
Metacognitive Awareness (MAI)	Questionnaire	Athlete		X		X	X
Athlete Training Behaviours (TTABQ).	Questionnaire	Another-athlete		X		X	X
Athlete Performance	Coach Performance Criteria	Coach		X		X	X
Unintended outcomes	Interview	Coach					X
Process evaluation							
PF provision of Need Support.	Questionnaire	Coach *			X	X	
Coach need satisfaction	Questionnaire	Coach *				X	
Coach understanding of PS	Multiple Choice	Coach	X				
Coaching Discrepancies	Questionnaire	Coach		X		X	
Coach Beliefs towards PS	Questionnaire	Coach *				X	
Coach Intentions.	Questionnaire	Coach *				X	
Procedural knowledge coach situational interview	Interview	PF rated					X
Coach provision of towards relatedness	Questionnaire	Athlete		X			

Note. * Responses were confidential to PF

therefore there were four versions of the questionnaire each of which referred to a different psychological skill (goal setting, imagery, relaxation, self-talk; See Appendix F for an example). Chapter 3 confirmed the factor structure, predictive and concurrent validity and internal consistency of the questionnaire. Athletes completed the version which applied to the PS being developed during the WI or MI and rated each item on a 5-point scale (*0 = never; 1 = rarely; 2 = sometimes; 3 = often; 4 = Always*).

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Coaching of PS-need support (CPS-NS). The CPS-NS was a single factor scale, measuring explanation giving (4 items) and seeking athlete involvement (4 items). Chapter 3 established the factor structure of the questionnaire and revealed good internal consistency. Again as with the CPS-F, there were four versions of the questionnaire and athletes were requested to complete the version which applied to the PS being developed by their coach. (See Appendix F). Athletes rated their experiences on a 5-point scale (0= *Not at all true of me*, 4= *Very true of me*).

Metacognitive awareness inventory (MAI; Schraw & Dennison, 1994). The MAI subscale measuring an individual's knowledge of his or her own cognition (declarative, conditional and procedural knowledge) was adapted to apply to a sports context (e.g., *I am aware of what strategies I use when I study* was adapted to *I am of what mental strategies I use when I play sport*). Each item was rated against a 100mm with the right end labelled *true* and the left end *false*, and participants recorded their responses by drawing a line across the scale at the point which corresponded to how true or false the statement was about them. Chapter 3 confirmed a three factor model (declarative, conditional and procedural knowledge) with 12 items displaying an adequate fit (see Appendix G) and internal consistency. The MAI was conceptualised as a single factor scale for the purposes of this analysis.

Athlete training behaviours (TTABQ). The Trait Training Attitudes and Behaviours Questionnaire (TTABQ; Oliver, 2009) contains seven subscales (motivation, professional behaviour, professional attitude, motivation, coping, seeking improvement, effort-extra, effort in training). Initial validation work on the measure has supported its 7-factor structure. (Oliver, 2009). In the current study we were only interested in the subscales; motivation, coping and effort in training sessions (the motivation subscale was used for missing data analysis only). The TTABQ was designed as an athlete self-report measure, however to avoid

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self-report bias and the sole-reliance on single source data, it was adapted to be completed by an informant athlete who normally trained with the nominated athlete (e.g., This athlete always turns up with the correct kit for training). The items were scored on a Likert-type scale ranging from 1 (*strongly agree*) to 7 (*strongly disagree*). In the current study, the same athletes rated each other throughout the three time points and the TTABQ (informant version) revealed adequate internal consistency with Cronbach alpha coefficients of ranging from .73 to .90 for all subscales.

Athlete performance. To obtain a measure of athletic performance which could be compared across sports and would be relevant to each coach and athlete, each coach created a bespoke performance scale. Such an approach has been utilised successfully in other performance-focused psychology studies (e.g., Hardy & Hutchinson, 2007), thus was deemed appropriate here. Each coach listed and clearly defined ten elements (physical, tactical, and/or psychological) which they thought indicated ‘excellent’ performance in their sport (e.g., team player: the ability of the player to get along and mesh with teammates on and off the field). At the start of the programme, each athlete then selected five out of the ten elements listed which they thought were most important to them and their performance. Their coach then rated each athlete on these five characteristics on a 1 (*this athlete does not display this aspect at all*) to 10 (*this athlete displays this aspect to its maximum*) scale. This scale showed good internal consistency at pre-test ($\alpha = .86$).

Intervention process.

Coach-rated need support. Markland and Tobin’s (2010) measure of needs support was adapted for this intervention (see Appendix B) to measure coach perceptions of need support provided by the programme facilitator (PF). The items referred to the extent to which the PF promoted autonomy (e.g., provided choices and options), structure (e.g., made it clear what to expect from engaging in the activities with her), and involvement (e.g., was

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concerned for coach well-being). The responses to the items were scored on a five-point scale from 0 (*not true of me*) to 4 (*very true of me*) and showed good internal consistency ($\alpha = .93$).

Basic need satisfaction in sport scale (BNSSS: Ng, Lonsdale, & Hodge, 2011). The BNSSS measures perceived basic need satisfaction in sport (Ng, Lonsdale & Hodge, 2011) that includes the following five subscales; competence, relatedness and 3 types of autonomy, choice (the perception of decision making flexibility), volition (unpressured willingness to engage in a activity), and internal perceived locus of causality (IPLOC: actions initiated and regulated by an internal force). The items were adapted to apply to coaching PS and coaches responded to the items using a 7-point Likert scale (1 = not true at all, 7 = very true) The BNSSS five factor model fit was confirmed by Ng et al. (2011) with along with the internal consistency and test-retest reliability of the scale.

Coach understanding. To establish the basic coach understanding of the nature of PS, coaches were asked two multiple choice questions, (1) What are PS? and (2) How are PS developed?. For each questions they were given a choice of four answers, one of which was correct. Each was awarded 1 point or 0 points for each correct answer (see Appendix H for details).

Coaching discrepancies. In order to measure coaches' awareness of discrepancies regarding their perceptions of their coaching, a version of the selves questionnaire (e.g., Carver, Lawrence & Scheier, 1999) was employed. In the selves questionnaire each participant describes their own ideal self by writing a list of ideal characteristics before rating how close they feel they actually are to these ideals. This allows different selves to be captured which are unique to each individual and the results they produce have been shown to predict a range of emotions (Carver et al., 1999). Coaches were therefore requested to list five phrases regarding their own coaching which described the nature of their ideal coaching (or their ideal coaching self). Coaches then rated the extent to which their actual coaching

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represented the ideal descriptions, by circling ‘how much you think your coaching is like this’ on a 1 (*not at all*) to 4 (*very much*) Likert scale (see Appendix I). A discrepancy score was then calculated as difference between the maximum score on each item (4) and what the rated their actual coaching to be on that item (e.g., a rating of 1, creates a discrepancy score of 3).

Coach beliefs towards PS. Coach beliefs were captured as a global construct which included attitudes towards PS, norms and perceived control. As a measure of coach attitudes, coaches were asked to rate four pairs of bipolar adjectives in the relation to the stem ‘For me coaching my athletes about mental skills in the next month would be....’ *worthless-valuable, negative-positive, harmful-beneficial, foolish-wise* on a 1-7 scale. A version of this scale has been used in many TPB studies (e.g., Elliot & Armitage, 2009; Barkoukis, Hagger, Lambropoulos, & Tsorbatzoudis, 2010). Perceived behavioural control (PBC) was measured using adapted items from Hamilton, Cox, and White (2012), “I have complete control over whether I coach my athletes about mental skills in the next month” and “It is mostly up to me whether I coach my athletes about mental skills in the next month” rated on 1 (strongly disagree) to 7 (strongly agree). These PBC items were significantly correlated ($.43, p < .05$). Finally, subjective norms (SN) were assessed using two items adapted from Elliott and Armitage (2009), ‘Important people who are involved in my coaching (e.g., parents and other coaches) would think that I (*should– should not*) coach my athletes about mental skills’, and a reversed scored item, ‘The athletes I coach would want me to coach them about mental skills.’ (*Strongly disagree-strongly agree*). Each item was rated on a 1-7 scale and these items were significantly correlated ($.47, p = .05$). Each subscale was summed and then an averaged to create a single measure of coach beliefs.

Coach intentions. Two items assessed the strength of intention to perform coaching of PS (adapted from Hamilton, Cox & White, 2012), “I intend to coach mental skills regularly

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after this programme,” and “I expect that I will do regular coaching of mental skills after this programme,” rated from *strongly disagree* (1) to *strongly agree* (7).

Procedural knowledge. Coaches’ procedural knowledge (how to coach PS) and strategic knowledge (when to coach PS and why coaching in that way) was measured using a situational interview at the end of the intervention. During the interview coaches were asked to suggest how they could effectively assist the following, “You are giving advice to another coach, who would like his/her athletes to improve their performance by using *the specific PS* more effectively, what information about coaching the *specific PS* might you give him or her?” Each interview was marked using the same marking scheme for accuracy of coaches’ procedural knowledge (how to coach PS) and strategic knowledge (when to coach PS and why coach PS in that way; see Appendix J for full details of interview and marking scheme).

Coach relatedness. The relatedness subscale from Markland and Tobin’s (2010) measure of needs support was adapted for this intervention to measure athlete perceptions of need support provided by their coach, which was used in missing data analysis (see analysis/results section for more details). The five items referred to the extent to which the coach promoted involvement (e.g., was concerned for my well-being). The responses to the items were scored on a five-point scale from 0 (*not true of me*) to 4 (*very true of me*) and showed good internal consistency ($\alpha = .92$).

Procedure. The recruitment process for coaches and athletes is displayed in Figure 4. Initially, the Home Country National Institute of Sport identified priority sports based on performance potential and contacted the specific performance directors and coach development personnel to identify elite level or potential elite level coaches. Coaches were then invited to participate in the study and athletes were recruited to participate by their coaches. Each athlete (and Parents if under 16) were given written intervention information by the PF before informed consent was taken (See Figure 4, for numbers of coach and athlete

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recruited and final participant numbers). As can be seen from Figure 4 and Table 15, there were five intervention data collection points (baseline - *coach only*, pre-test, mid-test *coach only*, post-test and follow-up). Athlete and coach data were collected during specific data sessions with the PF or a trained research assistant in a quiet place at the training venue, either before or after training. Clear explanations and examples of PS were given to respondents along with anti-social desirability instructions prior to completion to ensure accurate and honest responses. Coach responses on the measures which were likely to be influenced by social desirability due to the relationship with the PF (such as PF provision of need support; see Table 16) were completed confidentially, placed in a sealed envelope and posted to a member of the research team who was uninvolved in intervention delivery. The researcher then allocated anonymous codes to all of this data before it was inputted and analysed.

We planned the intervention delivery so that both the MI group and the WI group were given similar information about PS. The information was based on content from Burton and Raedke (2008), findings from this PhD (Chapter 2 and 3) and Williams (2010). As previously described the process of intervention delivery was design to differ between the two groups. The MI group received at least 6 sessions (approx. 14 hours) with the PF (see Figure 1 and Table 2 for details) focussing on the PS selected by the coach (*4 = coaches chose goal setting, 4 = self-talk, 2 = Relaxation, 2 = Imagery*). Table 16 provides a summary of activities which took place in each session and how the activities were intended to impact on the components of the intervention model. Each one-to-one mentoring session between the PF and coach was organised at times and places that were convenient to the coach. Each session's purpose was clarified at the beginning, and the content of each session was tailored to the specific coaches' needs. To communicate the information during sessions, the PF prepared sport specific power point slides and provided a range of activities to suit each

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coach's learning styles. Coaches also received written information, copies of relevant book chapters from Burton and Raedeke (2008) and handouts/worksheets where appropriate.

During all sessions unconditional positive regard was provided, to ensure that the coaches felt supported.

The WI group coaches had the opportunity to participate in three pre-recorded workshops which they could watch on a DVD or via an online link (see Figure 4 for timeline). Each workshop was delivered by the PF, accompanied by power point slides and recorded using Panopto software. The software allowed coaches to simultaneously view an audio-video recording of the PF speaking whilst displaying the relevant power point slides.

Table 16

Mentoring Intervention procedure including the purpose and format of the six intervention session

Week no.	Session no.	Session format and duration	Purpose of facilitation
2	1	Observation of coaching session (60-90mins of coaching observation; 20 mins one to one discussion with PF) 1) Provide explanation of the intervention 2) Seek contextual information	i) *Rapport building ii) <i>*Enhancing PF's understanding of the context to plan intervention appropriately</i> iii) <u>Increasing coaches' understanding of the intervention.</u>
3	2	Coach needs assessment session (120-180mins one to one session with PF) 1) Explanation of the intervention & session 2) Explanation of PS with handouts 3) Coach reflection exercise about amount of mental training currently delivered. 4) Coaching PS profiling, PS topics selected. 5) Set goals regarding coaching of PS 6) Question coaches regarding preferred learning style	i) <u>Increase coaches' understanding of PS</u> ii) (d) <u>Increase coaches' awareness of discrepancies regarding their coaching and PS</u> iii) # (b) <u>Foster feelings of competence by identifying where coaches are already coaching of PS and give encouragement about coach ability to achieve goals</u> vi) <i>*Facilitate coaches to make choices about programme content</i> v) <u>Tailor intervention to coaches learning style</u>
5-7	3	Information session 120-180 mins; One to one session with PF) 1) Explanation of the session 2) PS information presented informed by session two (coach profile and goals). 3) Multiple coaching of PS strategies introduced beginning with basic information 4) PF supervised coach use of PS which was applicable to athletes 5) Discuss coach views or concerns about PS activities	i) <u>* (p) Individualised, coach relevant information of PS</u> ii) (b) <u>persuasive communication about positive outcomes of coaching PS</u> iii) <u>Provision of a choice of ways to coach PS</u> iv) # <u>Provide the coach with mastery experiences of PS</u> v) (b) (p) <u>Graded tasks easy-hard</u> vi) (b) (p) <u>Modelling of coaching PS</u> vii) <u>*positive regard and feedback</u>

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vii) * (b) roll with coach resistance and re-discuss athlete needs

8-10	<p>4 Planning session (One to one discussion with PF; 50-120 mins)</p> <ol style="list-style-type: none"> 1) Explanation of the session and recap coach goals 2) Review of PS information, coaches' experiences of PS and athletes needs 3) PF assisted coach to plan the coaching of PS (when, where, how), to begin with easy tasks 4) Discuss concerns and potential obstacles 5) Coach rehearsal of PS delivery with PF 6) Feedback provided by PF and necessary adjustments were made to plan. 	<p><i>i) #* (p) Consolidate coach knowledge</i> <i>ii) (p) facilitate the creation of a specific plan of behaviour change (coaching PS)</i> <i>iii) *Recognition of coach ideas regarding behaviour change</i> <i>iv) #Provide the coach with mastery experiences of PS</i> <i>iv) # Provide feedback to coaches.</i> <i>v) * (b) acknowledge coaches experiences and assist coaches to address concerns PS</i></p>
12-14	<p>5 Supervised coaching of PS Session (60-90mins observation; 20 mins one-to-one discussion with PF)</p> <ol style="list-style-type: none"> 1) Coach delivery of PS to athletes based on session 5 plan. 2) PF observed coaching PS optional and contributed if requested. 	<p><i>i) #Coach gaining mastery experience of coaching PS.</i> <i>ii) (b) * ensure coaches have chosen to be observed during this session</i> <i>iii) * (p) Support coach during session if requested</i></p>
16-18	<p>6 Feedback and future planning session (60-120 mins; one to one session with PF)</p> <ol style="list-style-type: none"> 1) explanation of session 2) Discussion: coach reflection and PF provision of feedback. 3) Coach evaluates their goals 4) Discuss coaching PS with different athletes at different times 5) Formed action plan of future coaching PS 	<p><i>i) *Provision of reflection and feedback opportunity.</i> <i>ii) (p) Increased quality of coaches PS delivery</i> <i>iii) #Coach gaining mastery experience of coaching PS and goal achievement.</i> <i>iv) (p) Facilitated coach planning for ongoing PS & maintenance.</i></p>

Note. *=Relatedness; *Autonomy*; *Structure*; #=Mastery experiences, (b) = coach beliefs, (p) = procedural skills and knowledge, (d) elicit discrepancies. PF= Programme Facilitator

Coaches could also navigate through the recording with ease using a contents bar, which displayed all of the workshop content in a vertical list. The introduction session was 20.36 minutes long and explained the intervention process and the nature of each PS in order to assist the coaches to choose which PS they would like to develop (*6 coaches chose goal setting, 4= self-talk, 2= imagery*). The introduction session was accompanied with a learning booklet featuring the information on the slides and an activity to assist coaches to reflect on their coaching of PS (comparing the importance of mental factors to competitive performance with how much time the coaches spent giving mental training). The second workshop explained the nature of the specific PS, how and why the skills helped athletes perform, and

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the third workshop explained how to go about coaching the PS with their athletes. To accompany the second and third workshop a second information booklet was provided, featuring the information from the slides, notes pages for coaches to reflect on their use of PS, worksheets featuring PS activities they could use with their athletes and the specific PS book chapter (Burton & Radeke, 2008: copyright obtained from Human Kinetics). The mean length of the second and third workshops recording was 25.74 minutes (*SD* 4.08). At intermittent occasions during the second and third workshops coaches were requested to stop the recording to complete various exercises and so the intended participation time of each workshop was approximately 1 hour 30 minutes.

Following the post-test and follow-up data collection, a coach interview was conducted with all participating coaches in both groups to gain further insight into the intervention outcomes, the impact of coaching PS and coach experiences of the intervention processes. Nineteen coach interviews (mean duration 52.9 minutes, *SD* 15.93) were conducted over the telephone and recorded using Adameus software and transcribed verbatim.

Analysis

Quantitative Analysis. From 25 coaches who began the study, 21 completed it. Athlete drop-out was 47.37 % at post-test and slightly lower at follow-up with 36.87% drop out (See Figure 2 for details). To avoid a loss of power and sample biasing resulting from listwise deletion (Harel, Zimmerman, Dekhtyar, 2008) comprehensive data imputation was used for all variables. The method of ‘hot deck’ imputation was adopted using Myers’ (2011) syntax macro within SPSS, which replaces missing values with corresponding values from ‘donor’ responders who match the respondent with missing data on selected ‘deck variables’(see Myers, 2011 for full explanation). The deck variables in this study were selected as variables of interest and/or variables found to be related to missingness. The deck

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variables⁴ for missing athlete data were intervention group, pre-test self-rated athlete motivation and pre-test athlete-rated coach involvement. To impute coach self-reported missing data the donor variables were group and baseline perceived control of coaching PS. The hotdeck method of imputation has distinct advantages, over multiple imputation techniques as the imputations using hotdeck are based on realistic, observed values (Siddique & Belin, 2008). Hotdeck imputation are also simple to implement and enables the analysis of a single data set. Hawthorne and Elliott's (2005) investigation found that hot deck imputation was over 80 times more effective than listwise deletion and hot deck imputation outperformed pairwise deletion and mean substitution.

In order to strengthen the interpretation of the data the effect sizes of tests were considered alongside significance testing and the qualitative findings. As well as referring to effect sizes of Cohen's d (d : Cohen, 1992) as trivial (0- 0.19) small (0.20-0.49) medium (0.50- 0.79) and large (0.80 and greater), partial-eta squared (η^2) can be considered to be small (0.1) medium (0.59) and large (1.38; Cohen, 1992). For this study, as with medical interventions, the effectiveness of an intervention was considered relative to the minimum clinically (or practically) important difference. This difference signifies the smallest change in outcome measures that must occur for the intervention to be considered effective, which is usually equivalent to an effect size of 0.20 or above (cf. Winter, Abt & Nevill, 2014). Although this is a seemingly small effect, in the context of applied research with an elite sample of individuals which compares an MI to 'usual practice' rather than a placebo control, an effect size 0.20 is suggestive of some form of meaningful change. Therefore, in the current study effect sizes of 0.20 or above were considered to signify practically meaningful differences in outcomes as a result of the intervention.

⁴All deck variables were converted into categorical variables as recommended by Myers (2011) when sample size is limited

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To assess **intervention outcomes**, the changes in the coaching of PS (via the CPS-F and CPS-NS) and athlete awareness of their use of PS (via the MAI) were assessed over time using two-way (group: mentoring/workshop \times time; post/follow-up) mixed model ANCOVAs controlling for pre-test scores (as a covariate). To test the indirect effect of each coaching PS behaviour (observation, targeted cueing, encouragement and need support) on athlete performance, mediation analyses (see Figure 3 for details) examined whether the coaching of PS impacted on athlete performance via improved athlete awareness of PS, leading to greater athlete use of PS in training and subsequent increases athlete training). The mediation hypotheses were tested using PROCESS (Hayes, 2013) to test models with serial multiple mediators. The PROCESS macro produces bootstrapped estimates for the total and specific effects and effect contrasts, alongside the bias corrected and accelerated 95% confidence intervals. It can be concluded that an indirect effect is significant (at $\alpha = .05$) if its 95% confidence level does not encompass zero. The macro elicits the total indirect effect and the different indirect effects through each mediator whilst controlling for effects of all the other mediators via bootstrapping. Eight regressions were ran in total. Firstly, four analyses were ran, one with each of four with each of the coaching PS behaviours (observation, targeted cueing, encouragement and need support) and with the third mediator as athlete effort. All regression analyses (Analyses A) were ran with 10000 bootstraps were conducted, with each coaching PS behaviour as an independent variables, athlete performance as the dependent variable and athlete awareness of PS, athlete use of PS in training and athlete effort in training as sequential mediators. An additional four regressions were then run with athlete coping replacing athlete effort as the third mediator. A strength this analysis was its longitudinal nature and the multiple data sources using athlete-reported coaching of PS at post-test, self-reported athlete awareness at post-test, informant rated training behaviours at follow-up and coach rated performance at follow-up. The assumptions

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of linearity and homoscedasticity were also assessed. PROCESS contains a specific cluster function for dealing with non-independence in data, which controlled for any potential effect associated with the nested nature of the data (within groups of athletes coached by each coach).

To assess the **intervention process**, a variety of analyses were utilised. The perceived levels of need support rated by each coach was tested using *t*-tests (group: MI vs WI) at both midtest and pretest. Also to understand whether the MI was more effective at facilitating all of the components of the intervention model (coach understanding of PS, coach awareness of discrepancies, coach need satisfaction, positive beliefs towards PS, coach intention to coach PS and coach procedural knowledge) between *t*-tests (group: MI vs WI) were conducted (see Table 20 for bivariate correlations). *T*-tests were ran as the intervention model depicted a timeline of active ingredients, we were interested in the differences between the groups at specific time points. Conducting multiple *t*-tests can increase the risk of Type II error, increasing the likelihood of finding significant effects by capitalising upon chance. In order to avoid this issue, only the effect sizes (Cohen's *d*) were used to interpret the findings (cf. Winter, Abt, & Nevill, 2014). To understand whether the components of the intervention model were positively related to the coaching of PS, bivariate correlations were conducted between coach ratings of model components and athlete ratings of the coaching of PS aggregated to each coach.

Qualitative Analysis. As with Chapter 2, framework analysis (Richie & Spencer, 1994) was used with a deductive *a priori* framework of categories and inductive development of the framework to incorporate emerging information (Miles & Huberman, 1994). Firstly the PF fully familiarised herself with the data (Richie et al., 2003) via transcription and re-listening to the interviews. An initial thematic framework was then created based on the study hypotheses and initial impressions of the interview data. The mentoring group and workshop

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coaches' data were then analysed as two separate groups and portions of transcripts which referred to relevant categories were charted into theme tables. Following the charting process, the material was summarised into broader key themes. We then carried out pattern analysis (Ragin, 2000) on the summarised data by the PF to compare between the MI and WI groups so that similarities and differences could be understood. In order to increase the creditability and dependability of results (Patton, 2002), an additional investigator who was blind to the intervention hypotheses and an expert within large scale performance psychology interventions was invited to act as a "devil's advocate". This researcher examined all of the summarised findings, and referred to the original sections of transcript in order to assess the appropriateness of each summary. The researcher critically questioned the analysis (Marshall & Rossman, 1995) by actively searching for contradictions in the patterns suggested. Both researchers discussed each pattern in turn, regularly returning to initial data charts and interview transcripts. During the meetings, the researchers worked collaboratively to ensure accurate portrayal of the nature of coaches' experiences and the differences between groups.

Results and Discussion

Each results topic has separate sections reporting quantitative results (where measured) and qualitative results, followed by a summary of findings. The **intervention outcomes** reported were; the *intended outcomes* of, the coaching PS behaviours, athlete awareness of PS use and the coaching of PS impacting on athlete outcomes (awareness, athlete use of PS, athlete training behaviours and athletes performance); and the *unintended outcomes* of the intervention and the coaching of PS. For the ANCOVA results, the original unadjusted means are presented to enable ease of comparison between the groups.

The **intervention processes** reported are the coaches perceptions of their *intervention experience* (a) intervention format, (b) intervention content, and (c) the nature of intervention delivery including need support. Also reported are the facilitation of *active ingredients of the*

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intervention model (coach context, coach understanding of PS, coach discrepancies of PS, coach need satisfaction, coach beliefs regarding PS, coach intentions to coach PS and coach procedural knowledge). Furthermore, the elements of the intervention model and their relationship to coaching of PS, were also assessed.

Intervention Outcomes

Coach Outcomes.

Coaching of PS-Fundamentals. All of the assumptions of ANCOVA were met for each subscale and the ANCOVA analyses revealed the covariates, (pre-test scores) were significantly related to post-test and follow-up scores for each analysis. The ANCOVA for coach observation of PS revealed a medium to large main effect of time, $F(1, 141) = 13.97, p = .000$, partial $\eta^2 = .09$) with coach observation of PS increasing from post-test to follow up, however only a small, non-significant effect of group, $F(1, 141) = 2.79, p = .10$, partial $\eta^2 = .02$) was evident, and no interaction was revealed, $F(1, 141) = 0.43, p = .51$, partial $\eta^2 = .00$).

The ANCOVA for coach encouragement of PS revealed a significant main effect of time with a small effect size suggesting increases over time $F(1, 141) = 5.68, p = .02$, partial $\eta^2 = .04$) and no main effect of group $F(1, 141) = 0.00, p = .96$, partial $\eta^2 = .00$). Of more central interest a significant interaction with a medium effect size was revealed, $F(1, 141) = 12.22, p = .001$, partial $\eta^2 = .08$). Bryant-Paulson follow-up tests indicated the athletes in the MI group reported that coach encouragement of PS increased significantly from post-test to follow-up, whereas there were no significant changes within the WI group. The ANCOVA for targeted cueing of PS revealed a small yet significant main effect over time $F(1, 141) =$

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Table 17.

Actual Means (unadjusted) and Standard Deviations of all intended outcome variables

Measure	Subscale	Intervention group	Pre-test Actual Mean	(SD)	Post-test Actual Mean	(SD)	Follow-up Actual Mean	(SD)
CPS-F	Coach	Mentoring	1.51	1.11	1.67	0.99	1.98	0.88
	Observation	Workshop	1.31	0.93	1.43	0.97	1.67	0.80
	Coach	Mentoring	1.71	1.27	1.79	0.99	2.21	0.95
	Encouragement	Workshop	1.48	1.06	1.98	0.98	1.89	0.92
	Targeted	Mentoring	2.49	0.89	2.32	0.88	2.61	0.86
	Integration	Workshop	2.18	0.97	2.31	0.94	2.43	0.89
CPS-NS	Need Support coaching of PS	Mentoring	1.91	1.24	1.97	1.04	2.41	0.92
		Workshop	1.64	1.01	2.01	0.96	2.13	0.92
MAI	Metacognitive awareness	Mentoring	54.98	17.29	63.36	14.65	67.63	13.40
		Workshop	56.31	16.21	56.55	14.51	57.81	14.55
TOPS	PS use in training	Mentoring	2.87	0.71	3.07	0.61	3.19	0.55
		Workshop	2.83	0.62	3.02	0.62	3.12	0.49
TABQ	Effort in Training	Mentoring	5.15	1.16	5.39	1.04	5.26	1.11
		Workshop	5.11	1.10	5.33	0.77	5.41	0.77
	Coping with setbacks	Mentoring	5.41	1.06	5.53	1.05	5.20	0.97
		Workshop	5.40	0.92	5.34	0.74	5.42	0.60
Coach rating	Performance	Mentoring	6.75	0.12	7.68	0.81	7.30	1.18
		Workshop	6.74	1.34	7.47	1.25	7.95	1.08

6.05, $p = .02$, partial $\eta^2 = .04$), however no effect of group $F(1, 141) = 0.41$, $p = .52$, partial $\eta^2 = .00$) or interaction was evident, $F(1, 141) = 0.81$, $p = .37$, partial $\eta^2 = .01$).

Coaching of PS-need supportive. The ANCOVA analyses revealed the covariates as significantly related to post-test and follow-up scores. All of the assumptions of ANCOVA were met. The ANCOVA for the need supportive coaching of PS revealed a significant and medium sized effect over time $F(1, 141) = 7.68$, $p = .006$, partial $\eta^2 = .05$), no effect of group $F(1, 141) = .005$, $p = .96$, partial $\eta^2 = .00$) and a small, meaningfully-sized significant interaction $F(1, 141) = 5.52$, $p = .02$, partial $\eta^2 = .04$). Bryant-Paulson follow-up tests indicated that the MI group's athlete reports of need supportive coaching of PS increased

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significantly from post-test to follow-up, whereas there were no significant changes within the WI group (see Table 17 for means and SD).

Qualitative analysis: coaching of PS (see Table 18). Coaches in both MI and WI groups reported that their observation of PS increased “it’s made me actually look at, what’s happening with my athletes in some areas (WI)” and “I would say it makes you realise that you need to listen and observe more (MI).” Also in order to coach PS effectively, coaches discussed the importance of being able to facilitate two-way communication with their athletes, which was difficult for some coaches in both groups. “I think the biggest barrier we’ve found with him, is just his reluctance or his inability at the moment to express himself and say how he is feeling (MI)” and a WI coach realised that good communication is crucial to coaching PS effectively

What’s come home to me is there isn’t barriers. What I’ve got to do, is I’ve just got to see my way around, how to communicate with the ones that maybe are difficult to communicate with and the reason why they are difficult to communicate is actually, simply, the circumstances that are going on around them (WI).

Some of MI group’s discussion of observation and questioning was more in-depth than any of the WI coaches.

They do have something to say, just a ‘get out of jail free card.’ They’d say ‘yeah it was alright.’ ‘how was your race’ ‘yeah it was fine’so I think, just digging around a little bit more and asking more questions and then yeah, getting them to engage in the process at little more (MI).

In a training group they can perform sometimes at a higher level than they can do when they get to competition. So it’s observing them in training and competition and trying to see then, what’s changed or what is changing (MI).

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In turn only the MI coaches suggested that participating in the intervention had improved their understanding of the athletes they coached and the mental factors affecting their performances.

Coaches from both groups mentioned coaching using targeted cueing (TC) by instructing athletes using self-talk cues and setting specific goals for them. “think about ...painting the ceiling with your hair.’ So he keeps tall and he’s elongating his body up (WI).” Many coaches who had developed goal setting during the intervention reported increasing their TC by setting more specific goals in training and competition:

I knew that I had to be well, very detached and specific in what I said, you know there’s no point waffling about ‘oooh never mind’ you know, I had to be cool, calm and collected and give them the goals to go for (MI).

However, it was not clear whether TC in other forms using images or self-talk cues had increased due to the interventions.

Coaches in both MI and WI groups reported that their encouragement of PS had increased due to the programme “I have mentioned the word goal, we don’t just not mention it. But it’s been good that, you know, they’re used to hearing this from me now during the week (WI).” and “I think it’s made me emphasise to the athletes a little more about self-talk and the uses of it (MI).” Both groups specifically mentioned increasing their coaching of PS to assist athletes for competition preparation and cope with pressure.

If you watched 2 or 3 sessions beforehand (*before a competition*), so now I think you’d probably see that there is, me trying to get a bit more of them to....think through things and visualise it and put themselves in different scenarios, to learn skills, at the moment mainly with youngsters technical stuff but (*the senior athletes*) they’re the coping with their issues in the races so, people in front of her, disqualification cards coming in, or whatever (WI).

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Conversely, one coach in the WI group suggested that he had not encouraged or reminded his athletes to use PS enough “We didn’t do the right way, in terms of reminding them, to make use of the skill (WI).”

Coaches from both groups discussed being need supportive in their coaching by providing explanations about PS “it’s helped me to give more knowledge to explain to my young players about how to use goal setting (WI)”. However, one coach from the WI group suggested

I probably wasn’t as clear at times, as to what I really wanted them to do. I think as a coach, you’ve got to develop consistency and the language, to make it work for them, and so, I think I was a little fluffy sometimes my own lack of, practice, if you. You know, meant that we didn’t really get the right, the right concept across, we didn’t get the right introduction (WI).

On the other hand, none of the MI coaches mentioned difficulties about a lack of clarity when explaining PS.

The MI group also reported encouraging athletes’ autonomy and involvement when coaching PS.

It’s not about me when I coach anymore, it’s about them, I suppose which is a bit strange. You know, that’s probably how it should be, rather than me always coming up with, well this is the plan, this is what we are working on, this is what we are doing. It’s like well, what do you think you need to improve on? And, how are we going to achieve that? (MI).

On the other hand, some coaches in the WI group talked about PS in a more controlling way

We’d turn that round to, ‘why did you have a s**t start?’ what do you need to improve?’ Did you think you were going to have a bad start before you had the bad start?’ ‘Were you thinking positive thoughts, before it, were you drawing on your

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previous experiences, you know you had a good start last time, why couldn't you repeat it this time?' Going down those lines more than anything else. Because that's where I find the best benefit is that, you are now able to listen to their conversations to their first lines, more often than not. And remind them that, they should be dealing with it in a positive manner, rather than a negative manner.

Whilst this coach's approach could be effective it is not particularly need supportive due to the use of closed questions, harsh language and telling the athletes what they 'should' be doing.

A key area of coaching PS mentioned by coaches was getting athlete buy in, which some coaches in both groups said they found difficult and indeed some coaches said they 'gave up' with some reporting that "trying to sell it to the athletes, I think that was definitely difficult, especially having them all together (MI)." A MI coach who came into regular contact with high level athletes gained buy in from his athletes by explaining how those athletes used PS.

It's something that, I know is used at a high level and I know it can be used by lots of people, there is a good chance we'll perform better if we can, if we can make use of the skills that this will give us. So that's enough to make anyone sign up really (MI). Additionally, coaches from both groups discussed coaching of PS as an ongoing process of trial and error, which takes time.

I think with a little bit of perseverance and a little bit of patience, I think that kind of solved itself, kind of sorted itself out, the athletes who have decided that they want to give it a go have given it a go (MI).

And a coach from the WI group echoed this sentiment "it's not a case of how your system could be improved, but the coach and the athletes to be aware that it's an ongoing process (WI)." However, two coaches in the WI group suggested they hadn't increased their

Table 18.
Summary of qualitative findings of coach outcomes

Intended coach outcomes			
Increased coaching of PS (W, M) Little change in coaching PS (W 2 coaches)	Fundamental CPS	Coach observation	Increased observation of PS use (W, M) Increased in depth questioning of PS use and performance (M)
		Targeted cueing	Increased coaches setting the athletes goals (W, M)
		Encouragement of PS	Increased mentioning and reinforcing PS use (W,M) Increased assistance for competition preparation using PS (W,M)
		Competition preparation	
	Need Supportive CPS	Explanation provision	Increased explanation provision (W, M) Lack of consistency and clarity in explanations (W 1 coach)
		Athlete Involvement	Encouraged athlete autonomy in PS (M) Controlling when discussing PS (W)
	Coach views of effective CPS as a result of the intervention		The importance of getting athlete's buy in (W,M) The importance of two-way communication (W,M) CPS is an ongoing process of trial and error (W,M)
Unintended coach outcomes	Improved communication with athletes	Clearer rationale provision for activities (W,M) Better listener (W)	
	Improved planning of coaching sessions	Coaching more focussed on athletes goals (W,M) Better structure (W,M)	
	More process focussed coaching (W,M)		
	CPS shows coach investment in athlete development (W,M)		
	Application of goal setting within club leadership (W)		

Note: W = Online Workshop Intervention group, M = Mentoring Intervention group, CPS = Coaching of Psychological Skills

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coaching of PS or made significant changes to their coaching of PS following the intervention “Have I changed my coaching style and what I coach since 2007 and now? Yes, has it changed a lot? No if I’m honest and that’s probably what you have seen in the questionnaires (WI).”

Unintended coach outcomes. Both groups of coaches suggested that as a result of the intervention they had improved the way they communicate with their athletes.

I think I’ve consciously made sure that with certain *athletes* more than others, I’m being. The way in which I perhaps explain to them what we are doing and perhaps the way I try to motivate them within those training sessions, I think has definitely changed (MI).

In the same way, coaches in both groups (and particularly coaches who worked on goal setting during the intervention) suggested that they had improved the planning and structure of their coaching sessions.

“Before I would have just turned up willy nilly, dur da dur and that was it and go home. But now I think about things more and I do, sort of jot things down and I’ll, put down good sessions and bad sessions and I always ask for feedback (MI).”

Similarly a WI coach suggested, “I think throughout the sessions, I’m more focussed on trying to help players achieve goals. I know what a player wants to achieve so you know, I’m trying to give them sessions around each players’ needs (WI)”. In particular, one of the WI coaches suggested that due to goal setting “In a *training* session I used to explain the session, about what I was looking for, but now I’d tell them a little more why I’m looking for that and why that has gone into our overall bigger picture.”

Coaches in both groups suggested that they now focused on specific processes rather than outcome orientated coaching “I’ve learnt the concept of, athlete X for example focussing too much on performance and not enough on technique...you would see me I think,

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concentrating much more on technique from the very beginning (MI).” A WI coach suggested “being careful, not to emphasize that he’s used to winning and I would never want to go down that route again because we can’t take care of that (WI).”

A coach from WI said he had become more democratic when coaching due to the programme, “Feedback I had from a coach was, they said, ‘over the last year you have changed a lot.’ Me?’ And I said, ‘oh right, in what way?’ and they explained it, they said, ‘you’re more understanding, you listen more (WI).” Also some coaches from the WI and MI suggested that coaching goal setting implies you care more about the athletes and have confidence their ability ‘I’m sure they would get more out of just coming for a lesson, knowing that you would actually care about their development rather than just their money (MI).’

As a result of the programme, two WI coaches also began applying goal setting principles to their club strategy and leadership of other coaches. “From a *sports* development point of view, it’s helped me look. It’s challenged me to look at a management point of view and how things, what sort of goals and areas we can target the *sport’s* development at. (WI)”

We need to have more people assisting right across the board and also, they’ve got, I believe that they need to have strategies and goal plans for what they are trying to achieve, for instances even down to the individual within the club who is selling the kit. (WI)

As a result of strategic goal setting and a more democratic leadership style “I just think everybody’s a lot happier, you know as all the elements that are going on (WI).”

Athlete outcomes.

Metacognitive awareness. The ANCOVA analyses revealed that the covariate was significantly related to post-test and follow-up scores in each analysis and all of the assumptions were met. The ANCOVA for procedural knowledge of PS revealed a non-

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significant trivial effect of time, $F(1, 141) = 0.50, p = .48$, partial $\eta^2 = .00$), however a significant large effect size of group was revealed, $F(1, 141) = 25.95, p = .00$, partial $\eta^2 = .16$), with the mentoring group athletes rating significantly higher procedural knowledge of PS than the WI group (see Table 17 for means and SD). There was no interaction between time and group, $F(1, 141) = 1.82, p = .20$, partial $\eta^2 = .01$).

Qualitative analysis: Metacognitive awareness. Some of the MI coaches suggested that the athletes had gained self-awareness. “What have the athletes, what they have gained from it (*the intervention*)?...think they have gained self-awareness (MI).” Similarly, “Most of them are now aware if things are starting to go wrong, and they know some strategies of trying to keep that balance and it’s working more often than not (MI).” Additionally a MI coach talked about changes in an experienced athletes’ awareness of PS “if she’s on the jump runway and she’s getting ready for a jump, I don’t think a bomb would disturb her concentration so, but I think she is aware of it more so than she has been in the past (MI).” Conversely, only two coaches in the WI group talked about athletes being more aware of their goals “I think by using the goal setting, it’s made them a lot more aware of where they want to be. (WI)” However, WI coaches did not mention improvements in athletes’ awareness of their application of goal setting or other PS or how to use PS effectively.

The impact of coaching PS. Figure 5 depicts the results of the mediation analyses. The means, standard deviations for the athlete variables included in the models are displayed in Table 15. Analyses A examined the indirect effect of coaching PS on athlete performance via athlete awareness of PS, athlete use of PS and effort in training in four separate analyses. Analyses B examined the indirect effect of coaching PS on athlete performance via athlete awareness of PS, athlete use of PS and effort in training and coping, in another four separate analyses. For Analyses A the first four separate models examined whether coaching of PS (model 1 = coach observation of PS, model 2 = targeted cueing of PS, model 3 = coach

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encouragement of PS, model 4 = need supportive coaching of PS) impacted on athlete performance via athlete awareness of PS, athlete use of PS and athlete effort in training. In analysis A (see Table 19) models 1, 32% of the variance in athlete performance was explained by coach observation of PS ($F_{5, 133} = 3.20, p = .00$). In model 2, 32% of the variance in athlete performance was explained by targeted cueing of PS ($F_{5, 133} = 3.61, p < .00$). In model 3, 32% of the variance in athlete performance was explained by coach encouragement of PS ($F_{5, 133} = 3.05, p = .01$). In model 4, 32% of the variance in athlete performance was explained need supportive coaching of PS ($F_{5, 133} = 3.05, p = .01$).

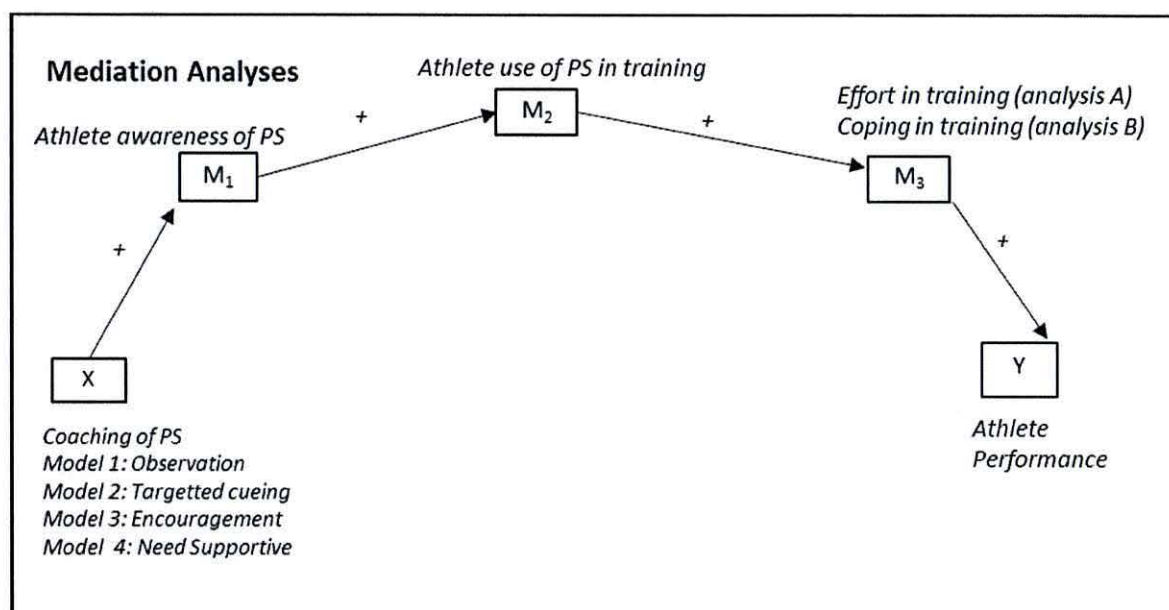


Figure 5. Diagram of mediational models for analysis.

The four analyses showed that each coaching PS behaviour was significantly positively related to the mediators, awareness of PS and PS use in training, which were significantly positively related to each other. Indeed as hypothesised full indirect effects were

Table 19.

Summary of mediator regression analyses A: direct and indirect effects of coaching PS on performance.

Analyses A																					
Effort		Model 1					Model 2					Model 3					Model 4				
Coaching of PS scale		Observation					Targeted cueing					Encouragement					Need Supportive				
Paths	β	SE	T	Lo	Hi	β	SE	t	Lo	Hi	β	SE	t	Lo	Hi	β	SE	t	Lo	Hi	
				95% CI					95% CI					95% CI					95% CI		
<i>IV (coaching PS) to mediators</i>																					
Awareness	7.14**	1.20	5.95	4.77	9.52 _b	7.97**	1.28	6.20	5.43	10.50 _b	5.47**	1.33	4.11	2.84	8.10 _b	6.94**	1.26	5.51	4.45	9.43 _b	
PS use	.17*	.06	3.06	.06	.28 _b	.25**	.05	4.65	.14	.36 _b	.21 **	.05	3.87	.10	.32 _b	.15**	.05	2.89	0.05	.25 _b	
effort	-.02	.11	-.18	-.23	.19	.03	.13	.24	-.22	.28	.01	.10	.11	-.19	.21	.11	.97	.97	-.11	.32	
<i>Mediators to DV (performance)</i>																					
PS use	-.02	.21	-.11	-.44	.39	.02	.20	.10	-.39	.43	-.10	.20	-.50	-.48	.29	-.06	.20	-.32	-.46	.33	
Effort	.18	.10	1.71	-.03	.39	.18	.10	1.77	-.02	.38	.18	.10	1.74	-.02	.38	.18	.10	1.74	-.02	.38	
<i>Mediator to Mediator</i>																					
Awareness to PS use	.02**	.00	4.88	.01	.03 _b	.02**	.00	4.38	.01	.02 _b	.02**	.00	5.33	.01	.03 _b	.02**	.00	5.33	.01	.03 _b	
Awareness to effort	-.00	.01	-.18	-.02	.01	.00	.01	-.30	-.01	.01	.00	.01	-.26	-.01	.01	.00	.01	-.26	-.01	.01	
PS use, effort	.53**	.16	3.34	.21	.85 _b	.50**	.17	2.84	.15	.85 _b	.52**	.17	3.09	.19	.85 _b	.52**	.17	3.09	.19	.85 _b	
	-.05	.13	-.40	-.31	.21	-.16	.12	-.94	-.36	.13	.07	.10	.69	-.13	.28	.04	.11	.25	-.18	.25	
<i>Direct effect IV on DV</i>																					
Indirect effects (<i>coaching PS on performance</i>)		Effect	Lo	Hi		Effect	Lo	Hi		Effect	Lo	Hi		Effect	Lo	Hi		Effect	Lo	Hi	
PS use			.04	-.10	.12		.03	-.10	.18		.01	-.08	.11		.01	-.13	.12				
Effort			-.00	-.05	.03		.01	-.04	.07		.00	-.03	.06		.02	-.01	.09				
Awareness, PS use			-.00	-.05	.05		.00	-.05	.05		-.01	-.05	.03		-.01	-.06	.04				
awareness, effort			-.00	-.02	.02		-.00	-.03	.02		.00	-.02	.01		-.00	-.04	.01				
PS use, effort			.02	.00	.05 _b		.02	.00	.08 _b		.02	.00	.06 _b		.01	.00	.04 _b				
Awareness, PS use, effort			.01	.00	.04 _b		.01	.00	.04 _b		.01	.00	.03 _b		.01	.00	.04 _b				

a Note: * $p < .05$; ** $p < .01$ b 95% confidence interval does not encompass zero at three decimal places.

Table 20.

Summary of mediator regression analyses B (including athlete coping): direct and indirect effects of coaching PS on athlete performance.

Analysis B Coping		Model 5					Model 6					Model 7					Model 8				
Coaching of PS scale		Observation					Targeted cueing					Encouragement					Need Supportive				
Paths	<i>B</i>	SE	T	Lo	Hi	β	SE	t	Lo	Hi	β	SE	t	Lo	Hi	β	SE	t	Lo	Hi	
				95% CI					95% CI					95% CI					95% CI		
<i>IV (coaching PS) to mediators</i>																					
Awareness	7.15**	1.20	5.95	4.77	9.52 _b	7.97**	1.28	6.20	5.43	10.50 _b	5.47**	1.33	4.11	2.84	8.10 _b	6.94**	1.26	5.51	4.44	9.42 _b	
PS use	.17**	0.06	3.06	.06	.28 _b	.25**	.05	4.66	.15	.36 _b	.21**	.05	3.87	.10	.32 _b	.15**	.05	2.89	-.01	.01 _b	
Coping	-.21*	.09	-2.18	-.39	-.02 _b	-.03	.12	-.24	-.26	.20	.05	.10	-.51	-.25	.15	-.01	.10	-.13	-.21	.19	
<i>Mediators to DV (performance)</i>																					
PS use	-.02	.20	-.08	-.42	.38	.05	.20	.23	-.35	.44	-.08	.19	-.41	-.45	.29	-.04	.19	-.22	-.43	.34	
Coping	.27*	.13	2.12	.02	.53 _b	.27*	.12	2.17	.03	.52 _b	.28*	.12	2.31	.04	.52 _b	.27*	.12	2.25	.03	.51	
<i>Mediator to mediator</i>																					
Awareness, PS use	.02**	.00	4.88	.01	.03 _b	.02*	.00	4.38	.01	.02 _b	.02**	.03	5.33	.01	.03 _b	.02**	.00	5.24	.01	.03 _b	
Awareness, coping	.00	.01	.10	-.01	.01	-.00	.01	-.54	-.01	.01	-.00	.01	-.59	-.01	.01	-.00	.01	-.57	-.01	.01	
PS use, coping	.33*	.13	2.56	.07	.58 _b	.25	.15	1.68	-.04	.54	.26	.14	1.85	-.02	.54	.23	.14	1.72	-.03	.50	
<i>Direct effect IV on DV</i>																					
Direct effect IV on DV	-.00	.14	-.00	-.27	.27	-.10	.12	-.83	-.35	.14	.09	.10	.85	-.12	.29	.06	.11	.55	-.15	.27	
Indirect effects (coaching PS on performance)		Effect	Lo	Hi		Effect	Lo	Hi		Effect	Lo	Hi		Effect	Lo	Hi		Effect	Lo	Hi	
PS use		-.00	-.07	.07		.01	-.08	.12		-.02	-.11	.07		-.01	-.07	.05		-.01	-.07	.05	
Coping		-.06	-.16	-.00 _b		-.01	-.08	.06		-.01	-.09	.03		-.00	-.07	.05		-.01	-.07	.05	
Awareness, PS use		-.00	-.05	.05		.01	-.04	.06		-.01	-.06	.03		-.01	-.05	.04		-.01	-.05	.04	
Awareness, coping		.00	-.02	.03		-.01	-.04	-.01		-.00	-.03	.01		-.01	-.04	.01		-.01	-.04	.01	
PS use, coping		.02	.00	.04 _b		□ .02	.00	.06 _b		.02	.00	.05 _b		□ .01	.00	.04 _b		□ .01	.00	.04 _b	
Awareness, PS use, coping		.01	.00	.00 _b		.01	.00	.03 _b		.01	.00	.03 _b		.01	.00	.03 _b		.01	.00	.03 _b	

^aNote: * $p < .05$; ** $p < .01$ ^b95% confidence interval does not encompass zero at three decimal places

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found in each of the four models between coaching of PS and performance which was mediated by athlete awareness of PS, athlete use of PS, and both athlete effort in training (see the bottom line of Table 19).

For Analysis B (see Table 20), the four models examined whether each coaching of PS behaviour (model 5 = coach observation of PS, model 6 = targeted cueing of PS, model 7 = coach encouragement of PS, model 8 = need supportive coaching of PS) impacted on athlete performance via increasing athlete awareness, athlete use of PS and athlete coping in training. In Model 5, 34% of the variance in athlete performance was explained by coach observation of PS ($F 5, 133 = 3.40, p = .01$). In Model 6, 34% of the variance in athlete performance was explained by targeted cueing ($F 5, 133 = 3.83, p = .00$). In Model 7, 34% of the variance in athlete performance was explained by coach encouragement ($F 5, 133 = 3.48, p = .01$). In Model 8, 34% of the variance in athlete performance was explained by need supportive coaching of PS ($F 5, 133 = 3.39, p = .01$).

The four analyses showed that each coaching PS behaviour was significantly positively related to the mediators, awareness of PS and PS use in training, which were significantly positively related to each other. Indeed as hypothesised a full effect indirect was found between coaching of PS and performance which was mediated by athlete awareness of PS, athlete use of PS, and both athlete effort and athlete coping. (see the bottom line of Table 20) .

Qualitative analysis: the impact of coaching PS (see Table 21). Both groups of coaches suggested that their athletes had increased their use of PS.

I would say the ultimate impact is the athletes are starting to using imagery...you can almost see at some points during, between throws they are thinking about what they

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are going to do next and you'll see them actually sort of, almost visualising. You see them mentally rehearsing and going through those patterns again (WI).

And "they are setting their own goals, you know, training goals now. (MI)." Both groups of coaches also talked about the athletes improved ability to deal with setbacks and the pressure of competition, "I definitely see an attitude change in some of my athletes, not just in trying but in their preparation and their mind-set before the race. (MI)" And a WI coach said,

They were a little up and down and more of them would lose a match just because they couldn't, you know deal with the stress. But whereas now, they're winning a lot of their matches, so it's. And you can see with any player, they are more focused and they are more goal concentrated on their game rather than losing their temper or not being able to deal with their emotions. So yeah, definitely a big impact (WI).

Table 21.

Summary of qualitative findings of athlete outcomes

Athlete outcomes		
Intended outcomes	Increased Athlete self awareness	Aware when things start to go wrong (M) Aware of different PS strategies (M) Aware of their goals (W)
Impact of coaching PS	Increased use of PS (M, W)	
	Improved training attitudes and behaviours (M, W)	Focus when training (W,M) Dedication to training (W,M) Taking responsibility for training (W,M) Engagement in self-analysis (W,M) Athletes more open in dialogue with coach (W,M) Ability to cope with set-backs and pressure (M,W)
	Improved athlete performance (M, W)	
unintended athlete outcomes	Increased inter-athlete support (M, W) PS helped with school work (M)	

Note: W = Online Workshop Intervention group, M = Mentoring Intervention group

Coaches from both groups reported marked improvements in their athletes training behaviours, particularly coaches who focussed on goal setting during the intervention. Many

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of the coaches in both groups suggested their athletes were more focussed, motivated and taking more responsibility over their training since the intervention.

There has definitely been an attitude change in a lot of the athletes and as a group.

Like even last night one of my assistant volunteer coaches was taking the top group for the first time in probably a couple of months and she was over the moon with the improvement, like the improved attitude, She said to me it's the best she's ever seen them train (MI).

He's always been dedicated but a little more now, in that he's travelling from XXXX and he might take the bus and then a walk to the track and you know on a cold winter's night and I just saw a difference (WI).

Coaches from both groups also suggested that many athletes were more engaged in the improvement process due to the intervention and coaching PS. As one coach from the WI explained "they are becoming more independent thinking as they goal plan their own strategies within training and what they want to get from their training (WI)". Coaches also thought the athletes were being more pro-active in their self-analysis and discussing their progress

Unknowingly they have gone into a process knowing what times they are hitting and saying 'I wasn't very good on that' and then giving me feedback....and I'm thinking this is good, because its coming from their goal planning (WI).

And another WI coach suggested due to coaching imagery

I get better quality feedback as well, so instead of getting, 'how did that feel?' and they go, 'OK', they might get 'well it's not quite, the entry wasn't right, it wasn't quite where I would have liked it, you know it was slightly to left or slightly to the right (WI).

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And coaches in both groups suggested that there was a generally more open dialogue and they were asked more questions by athletes, both of which was beneficial to progress.

Coaches in both groups suggested that athletes' performances had improved due to the intervention and the coaching of PS. "They have improved there's no doubt about it but you know, everybody has improved. But I think it's the rate at which they've (*athletes using PS*) improved is, is quite significantly larger (MI)." And a coach from WI said,

On the performance side, well all I can say is it's obviously had a positive effect, due to the fact that we've taken our squad, squad two from, to get into the squad two you had to have achieved 1.14 on 100m free. That's down to 1.08. Yes, so that's amazing (WI).

Some coaches wanted to recognise that it was a combination of factors alongside the coaching of PS which had assisted performances; "I think it's a combination of the physical training that they have been doing but also the confidence that they've gained from the mental side of it (MI)."

Unintended athlete outcomes. An unintended outcome mentioned by coaches in each group, was athletes supporting each other more.

It's had a big impact and I think they are quite a close group of players, they all help each other out in tournaments. They all know sort of each other's strengths and weaknesses now. When we go away, they you know, they help each other out. They sort of support each other (WI).

Additionally, one MI coach suggested that the coaching of PS had helped her athletes to deal with school work; "I think it's helping him, although his predicted grades at school are not brilliant, I think it's helping him to cope with that pressure (MI)."

Discussion of intervention outcomes. The results suggest that both interventions increased all coaching of PS behaviours. Between post-test and follow-up the MI group

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increased their encouragement of PS and the need supportive coaching of PS to a greater extent than the WI coaches. These results suggest that the MI seemed to facilitate the autonomous continuation of behaviour change following the intervention. The results showed that the MI group were more need supportive when coaching PS and consistent in their application of PS. The greater need supportive coaching of the MI group consisted of clearer explanations and engaging more in-depth coach observation and questioning. The understanding MI coaches obtained from observation is likely to have facilitated more individualised and relevant coaching of PS. Furthermore, in both groups gaining athlete buy in and engaging in coaching PS as a long-term assisted the effective coaching of PS. Coaches from both groups also reported that they had improved the way they communicated and listened to others whilst coaching and as a result of the intervention their coaching was more process-focused. Specifically developing goal setting during the intervention seemed to lead to a variety of positive outcomes, as goal setting improved coaches planning and reviewing of sessions. Furthermore, two WI coaches applied the goal setting principles to sport development strategies and improved their leadership of other coaches. These results suggest that both interventions facilitated the coaching of PS and other positive coaching behaviours however, the MI intervention was more effective in facilitating longer-term autonomous behaviour change regarding coaching of PS than the WI group.

In terms of athlete outcomes, the mixed method results suggested that athletes in the MI group increased their awareness of PS to a greater extent than the WI group. Furthermore, the quantitative and qualitative analyses suggest that coaching of PS impacted directly on both athletes' awareness and athletes' PS use. The increased awareness of the MI group is likely to have been a result of the MI coaches' coaching of PS, suggesting that the MI was a more effective intervention.

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As hypothesised, there was an indirect relationship between coaching PS and athlete performance which operated via increasing athlete awareness of PS, then increasing use of PS, which in turn influenced training behaviours (effort in training and athlete coping) to impact on athletes' performances. As well athletes improving their coping skills and effort in training, coaches also identified athletes' increased engagement in the improvement process resulting in better performance analysis and communication as a result of the intervention. Interestingly, the coaching of PS also resulted in a better team environment and athletes being assisted with school work in some instances.

In summary, a consideration of all the findings together indicates that both interventions created a range of positive athlete outcomes although, the MI intervention impacted more positively on athlete awareness of PS. However, it is important to note some of the other athlete improvements reported could have been simple maturity effects. Also some of the other behavioural changes coaches made (e.g., listening more, better planning of sessions) could have contributed to the reported changes in athlete's training and performance. Therefore it may have been behaviours other than the coaching of PS which impacted the most positively on athletes.

Intervention process.

Coach experiences (See Table 22 and Table 23).

Qualitative Analysis: Intervention format. Coaches suggested that a strength of both the interventions was the logical format. A coach described the MI process;

We talked about, it was my skills and my knowledge first and then we talked a little about skills and how they might work and then we talked about. It was logical, it was a logical pattern really. So it was my development first and then my delivery and then their development of the skill (MI).

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The coaches also suggested that the long term nature of both interventions facilitated coach behaviour change;

You might go on a 2 hour course and take your book away and that's the end of it, whereas this has been much more structured and you know, you've had time to think about it, implement it, and you've also been tested upon it as well (WI).

However, two coaches in the MI group, (coach A and coach B), suggested that the time commitment to participate in the programme was significant and sometimes a little arduous.

There's a little tiny bit thinks 'oh we've got another session now, this seems to be dragging on a little bit. I am in a bit of a rush, I would like to be somewhere else. But honestly, when we were in our sessions, you know me I can talk forever sometimes and I did find it enjoyable (MI).

The coaches in the WI found the DVD and booklet accessible, and benefitted from having a permanent resource;

If I could have videoed all my level 3 tutors whilst they were delivering I'd have been a far happier person to be able to sit here and go, right I'll just go over that again, because every time you just get more and more out of it (WI).

Another WI coach suggested "when you sent it (*the online link*) on my computer it was easier and I could just sit down and get out the book and listen to it, then I could freeze it and then go back to it, when I needed to (WI)" Coaches were also positive about the booklet they got given as a reference tool "the book was with me a lot of the time while I was trying to outline this (*with the athletes*), so there were some direct quotes from the book, I used as well (WI)." However, one coach from the WI said he "no I did find Microsoft Silverlight, a bit difficult to use because for the simple reason of local authority laptops (WI)." Also another coach suggested "I found it pretty hard work if I'm honest. But you know, well it's pretty informal

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isn't it, it's just you know here's the CD, you know, read it and just, read through the books. (WI)"

Most coaches in both intervention groups found the PF's flexibility helpful; "In terms of running the programme I think you have been really flexible in terms of when the questionnaires happen and coming to take details and stuff, that's been great." (WI) and "You were flexible with times, the venue was obviously fine for me. You fitted in say flexibly with times, say before, after sessions or whatever (MI)."

Coaches who received the WI commented that the interviews and questionnaire sessions provided contact time with the PF, increased accountability, reminded and challenged coaches regarding coaching PS.

The interviews, mid-term and final term help to try and keep me focused on trying to bring it (*coaching PS*) in and work over it. And yeah, I think it was useful, it kept a focus on there that I knew that I was going to get asked about it, if you like. (WI)' Another coach from WI suggested that completing "The questionnaires reminded me of what they (*the athletes*) consider to be the most, the biggest priorities for them. So actually the programme then gave a bit of understanding of how they were thinking (WI)"

However, coaches from both groups suggested that the wording of the questionnaires was sometimes unclear. "They did find some of the questions quite difficult to do, some of the questions I guess were asking things, in a different style, so their interpretation of the question they might have found difficult (WI)". Additionally, coaches in the WI group suggested that there was a lack of athlete understanding about why they were doing the questionnaires and how they would benefit from participating in the intervention. To overcome issues of athlete understanding, one coach suggested making data collection more interactive for athletes by doing group interviews. In addition, coaches also suggested that

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collecting observational data of them coaching would have been more useful. “Then you could say in the data, ‘yeah I watched this coach use self talk (WI).”

Some coaches also suggested some of the data collection sessions had been inconvenient (e.g., late in the evening during a competition week or in a rush before training). Indeed, many coaches suggested doing data collection online to make collection easier “if the questionnaires would be on a Smart phone, and then everything would be compiled on to a database rather than it being through post and pen and paper. I think everything could happen a lot more efficiently (WI).” Furthermore, a coach from the WI group suggested that the athletes in his squad who were under 14 would benefit from some PS information or tasks, as they were excluded whilst older athletes were completing questionnaires.

Table 22.

Summary of qualitative findings of coaches' experience of intervention content and format

Intervention process		Strengths	Limitations & Improvements
Intervention format	Both interventions (W, M)	logical long-term PF's flexibility	questionnaires difficult to complete data collection sessions inconvenient young athletes left out
	W only	DVD and booklet as permanent resource DVD accessible data collection provided contact with PF questionnaires reminded coaches of PS	difficult to download appropriate software Process was hard work
	M only	progressive learning in stages one to one time with PF	significant time commitment
Intervention content	Both interventions (WI, MI)	PS not in current coaching qualifications	
	W only	Easy to understand At appropriate level More in-depth than previous training	Made wrong choice of PS to study
	M only	PF helpful suggestions PF knowledgeable	Too much jargon More in-depth reading material

Note: W = Online Workshop Intervention group, M = Mentoring Intervention group, PF = Programme Facilitator

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Qualitative Analysis: Intervention content. Coaches suggested that the PS content within the current intervention was not widely covered in coach education courses and following their experience some MI coaches suggested “I think mental skills, coaching minds, whatever the thing is called or will be called, in the future, needs to be slotted in to every coaching qualification (MI).” Multiple coaches in the WI groups suggested the information was helpful and at the right depth for their requirements.

I found it a lot easier to understand goal setting from what you’ve put forward to me, if that makes sense. When I was on my level, when I was on my level 3 course, I found that they kept, they kind of overcomplicated it a bit (WI).

Some coaches suggested that the WI information was more in depth than other coach education. “So I think doing more of a distance learning with the aid of the booklet as well. It just got you thinking at perhaps a little bit deeper than just someone, you know, in a workshop with other coaches (WI).” Coaches in the MI made less comments about the level of information, but suggested that the PF was knowledgeable and made helpful suggestions “in terms of working with you. I mean you definitely know your stuff (WI).” and “suggestions which you know, in fairness are starting to show a few green shoots. And you know in a very short space of time (WI).” In addition, a MI coach studying a Sport Science degree suggested that the content was more relevant to his coaching than his University course.

It’s been something that I’ve not really gone in depth in at University. So for me, it was a bit more important or relevant to do something like this, which would definitely have an impact on my, on the style of coaching (MI).

However, one coach, (coach A) within the MI group suggested that the information delivered by PF involved too much jargon. “I think unless you’re talking to a PhD student, then I think it’s perhaps, people won’t absorb the jargon. They will want small little bits that

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they can easily put into a practical setting (MI).” Conversely another coach in the MI group suggested that he would have liked more in depth reading material “I would have liked there to have been if possible more literature, if not literature then, perhaps, a pointer as to perhaps a couple of good books you could look at for further information (MI).”

Some coaches in the WI mentioned the beneficial impact of choosing the right PS to develop during the intervention. However, one coach from the WI felt that he had made a mistake in choosing self-talk, as the athletes he worked with found it difficult to express their thoughts. “I think with the girls, I might have gone for something like visualisation rather than self-talk, I think they might have just found that easier (WI).” None of the MI coaches talked about the influence of choice of PS. One coach in the MI suggested that she would have liked to cover all PS rather than just one.

Intervention delivery.

Provision of need support. The analysis revealed that coach mean ratings of needs support were not significantly different between groups at mid-test, $t(18.23) = 1.29, p = .90, d = 0.05$. At post-test coach mean ratings of needs support were not significantly different between groups, however there was a medium to large effect size, suggesting that the mentoring perceived greater need support at post-test $t(20.38) = 1.73, p = .11, d = 0.77$.

Qualitative Analysis: mastery experiences. Most of the coaches suggested that a facilitative strength of the MI intervention was the practical and “integrated rather than force-fed” approach.

Well I’ve done a fair bit of coach education in *my sport* and I think the biggest difference is like I’ve just said. It’s not just a case of you or whoever it is being, having the knowledge in a certain area and saying ‘here you go, this is what you do’. It was more practical and applied which I think is the biggest thing (MI).”

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However one coach (coach A) from the MI group suggested that he would have liked the programme to be more practical. “You give us a bit of stuff to read, or you give a few examples it doesn’t actually sink in, I don’t find it that comfortable. I have to try and work things out a little bit for myself (MI).” Conversely, coaches in the WI only talked about the intervention content being practical, but not the intervention delivery.

Some of the coaches in the MI, said that they appreciated the PF’s assistance and support in setting up the programme with the athletes.

You were able to come down initially to speak to the athletes and ...introduce you to the athletes and explain to them, what are we doing, why we do it, how it can help them and kind of setting them up on the journey kind of thing (MI).

Additionally the PF facilitated the coach to deliver PS independently.

Then also, taking a step back and allowing me to kind of take over and carry on with it, because at the end of the day, it’s me as a coach that sees them on a week, well some of them on a daily basis. So that’s the biggest thing I really appreciate is the fact that it wasn’t just you coming in and running though sessions with the athletes. (MI).

WI coaches did not mention any assistance in setting up the intervention. Some coaches in the MI group were assisted by watching the PF directly interact with athletes during coach observation sessions whilst the PF was supporting the coach. MI coaches suggested that listening to the PF speaking to the athletes improved their procedural knowledge and clarified their understanding of their athletes. “The bit I found the most valuable was when you were there with the athletes and I think they found that very valuable as well. And so I actually learnt from what you were saying to them (MI).” Furthermore, multiple coaches in the MI (both those who had and hadn’t seen the PF input with athletes) would have liked more presence of the PF at training PF and more interaction between the PF and the athletes.

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It is worth considering, actually during those sessions, you know, you actually having an input a little bit to. You might be actually, just instructing or teaching or assisting the athlete with the coach present just for parts of the session, try to get something that they might find comfortable (MI)?

Alongside inputting more into training, one of the MI coaches suggested that it would have been beneficial for the PF to attend a competition with the coaches and athletes. Also coaches in the MI group suggested that they would have liked to have observed more models of how to coach PS effectively, such as “videoing someone who’s really competent at goal setting or a before and after scenario where you were doing, you know, incompetent but, but less competent and now very competent in the psych skill that they are trying to achieve (MI).”

Structure. MI coaches suggested the opportunities for feedback from the PF was a strength of the intervention “not just going from books or whatever you had a chance to get feedback and discuss things with somebody that was extremely helpful (MI)” and “We had someone to say either, ‘no that’s wrong or yes, you agree that, that’s a good way of doing it (MI).” Some of this feedback aided the coach’s confidence, “I think you’ve pulled me up more than knocked me down (MI).” Conversely, several WI coaches suggested that they would have liked to have been observed coaching and received feedback, which was not part of the WI.

I think sometimes the observation meeting is the more powerful one. Because you, from your point of view you’re seeing it from an outside, you’re sitting outside of the circle and you know what I might say to you in our meeting, you see something totally different (WI).

In addition to receiving feedback from the PF, some coaches from both groups suggested they would have liked more assistance in getting feedback from their athletes regarding their coaching of PS. “Feedback from the athlete or to see whether it’s actually works or

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not....kind of helping the coach to maybe to obtain feedback about how the goal settings impacting on the athletes (MI)”

Table 23.

Summary of qualitative findings of coaches' experience of intervention delivery

Intervention delivery	Group	Intervention Strengths	Suggested Improvements
Practical experiences	M*	Integrated, practical approach	More practical learning
		Assistance in setting up CPS from PF	More opportunities to observe CPS
		Facilitated to independently coach PS	PF present at more training sessions
		Able to watch PF interact with athletes	PF attending competitions
Need Support	M	Helpful Feedback from PF (S)	More assistance to obtain feedback from athletes (S)
		Feedback boosted coach confidence (S)	Less autonomy, more guidance (A)
		Activities specific to coach (A)	More independent learning (A)
		Somebody to talk to (I)	Ability to interact with other coaches (I)
		Availability of PF (I)	More assistance to obtain feedback from athletes (S)
		Genuine interest of PF (I)	
	W	Autonomous learning (A)	More feedback from PF (S)
		Discussion during data collection (NS)	More assistance getting feedback from athletes (S)
			Less autonomy and more challenge (A)
			More contact time with PF (I)

Note: W = Online Workshop Intervention group, M = Mentoring Intervention group, PF = Programme Facilitator, * no comments relating to practical experience were made by Workshop group, S = Structure, A = Autonomy, I = Interpersonal involvement.

Qualitative Analysis: Autonomy support. Some of the WI coaches suggested that learning by distance supported their autonomy as “the way it’s been delivered is you know you haven’t been rushed to do it. You’ve been given the opportunity (WI)” And another coach from WI suggested “doing this at a distance, is I think that it’s made you think for yourself much more, in this area...I haven’t done it because, you know, oh Rosie’s down here tonight, I’ve now got to, to be the part, you know, I could just be myself (WI).” However one of the WI coaches suggested he would have benefitted from less autonomy and more challenge to coach PS.

Some of the MI coaches suggested they experienced autonomy as they worked on topics which were specifically relevant to them “just really useful because it, just meant that

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all the time it was specific about the people that I'm dealing with (MI)." Another MI coach said;

I'd come to you and said, this was an area that cropped up and the next time you'd come back with, well here's some stuff that I've read and here's a photocopy of this and here are a couple ideas on this. So for me, that was, that's a really nice way to learn (MI).

However, one coach (coach B) from the MI group, found the level of autonomy regarding the coaching of PS challenging;

You would say, there's no right or wrong answers, no right or wrong ways to this, that and the other, but I did expect you to turn round and say to me 'right OK, this what the most successful coaches have done and this is how they did it.' So I would have liked to have known was I on the right track, was I not on the right track, I would have liked to have known a bit more feedback from other sources and model demonstration, and this is how you do it (MI).

Contrarily, coach A from the MI group suggested that he would have liked a more independent approach to learning on the MI "And then I have to, to work things out in my own mind, in that situation, how best to put things across."

Qualitative Analysis: Interpersonal involvement. MI coaches suggested "one to one time with a professional like yourself is definitely more beneficial than just listening to it and then going away and trying to incorporate it (MI)." As well as contact time the PF offered a listening ear to MI coaches.

When I first entered it, well I'll obviously will get the goal setting on board, that'll be good. But the biggest benefit I think, came from like I said, from it was almost beyond that, it was yeah. The fact that I would have, if I was having an issue, I would then have somebody to go and talk to about it (MI).

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The PF was not just available during the one to one sessions “you’ve been on the end of emails and on the end of the phone to kind of catch up and kind of bounce ideas off and things, and I think that’s where it helps (MI).” Conversely, it was intention that the WI intervention solely delivered PS information and indeed coaches who received the WI wanted more contact and support from the PF. “A little bit more time, to sit down with people like yourself maybe more often would have been useful (WI).” However, some coaches in the WI group inadvertently felt supported and benefitted from interaction with the PF and research assistant during questionnaire sessions and via telephone and emails.

You were coming to do all their sessions (*data collection*), I still had an opportunity to discuss things, or challenge you about things, or for you to challenge me about things. And I think it was really, that was more important than having the material in front of me (WI).

The MI group also described the PF as personable and genuinely interested in their coaching. “You were interested in and obviously it never felt like, it was a process you had to go through, it always felt like this was something you were genuinely interested in and passionate about (MI)”. And another MI coach suggested “I think partly because you are such a great person. The athletes like you, the mum’s like you, I like you (MI).”

Despite the interpersonal involvement provided by the PF, coaches within the MI group did suggest that their experiences on the intervention could have been improved by having the opportunity to speak with other coaches about the coaching of PS.

It would have been interesting you know to kind of talk about it in different sports and the challenges that they’ve come up against. I don’t know I think that would have been interesting as well, for me, or that would have made it better (MI).

Discussion of intervention experiences. Both groups of coaches found the long-term format of the interventions more facilitative than shorter-term coach education courses they

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had previously attended. If coaches had chosen the appropriate PS, the content of the WI was appropriate, accessible. However in some cases coaches had IT issues and one coach found the material hard work. Also having a permanent resource in the form of DVD and workbooks was helpful for coaches. Conversely, the PF's advice and the practical nature of the MI was facilitative for coaches, however not all MI delivery was ideally tailored to the individuals coaches learning style as intended (e.g., too much jargon or insufficient direction was reported as an issue by some coaches).

The quantitative and qualitative data show that the MI provided more need support than the WI, particularly in the form of structure, and interpersonal involvement. The MI received clear feedback regarding their coaching of PS and had regular contact with the PF who showed genuine interest in their coaching and provided a listening ear; the WI would have preferred more feedback and contact with PF. Furthermore, the WI was more need supportive than intended, as some WI coaches inadvertently received support during data collection sessions and via remote contact. Furthermore, the data collection sessions increased the coaches' sense of accountability to coach PS. Therefore, despite coaches suggesting that online data collection would be advantageous, if the WI was to be repeated, it would be unlikely to be as effective without including face to face contact opportunities with a PF. Moreover, despite seemingly high levels of interpersonal involvement provided by the PF, MI coaches would have liked to have shared more of their experiences with other coaches. This finding potentially indicates that the interpersonal involvement provided by one practitioner is limited and an individual's need for relatedness could be better satisfied by being in a group of individuals learning together. Finally, coaches on the MI were provided with more support to introduce PS and more opportunities for practical mastery experiences. MI coaches inadvertently benefitted from the PF directly interacting with the athletes and modelling coaching PS. This interaction was intended as a support for the coach whilst

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delivering PS, however it is possible that some of the positive athlete outcomes of the MI group could have occurred as a direct result of PF rather than the coach delivery.

Active ingredients of coaching PS (See Table 24).

Coach need satisfaction.

Autonomy: quantitative results. Autonomy regarding the coaching of PS (MI mean = 5.73, $SD = .67$; WI mean = 5.65, $SD = .40$) was not significantly different between groups at post-test with a trivial effect size ($t(20) = 0.49, p = .43, d = 0.13$).

Autonomy: qualitative results. All coaches were given a choice over which PS they developed however, during the intervention delivery the MI and WI experienced autonomy in different ways. WI participants were given autonomy over the learning process as they could choose to what extent they engaged with the intervention and how they used the material. However, the MI coaches were bound to participating in a certain number of sessions with the PF (albeit flexibly organised) yet they were given more choice over the content of each session to ensure its relevance. In the MI group one coach reported being frustrated by receiving too much autonomy.

Coach competence: quantitative results. Coach competence (MI mean = 5.11, $SD = 1.21$; WI mean = 4.50, $SD = .88$) was not significantly different between groups at post-test, however there was a medium effect size suggesting that the MI group had greater perceptions of competence than the WI group, $t(20) = 1.40, p = .17, d = 0.49$.

Coach competence: qualitative results. Coaches from both groups talked about their perceptions of their competence to coach PS as a barrier. However, coaches from both groups suggested that their competence and confidence to coach PS had increased throughout the programme, “probably the biggest barrier or difficulty is my confidence in doing it (*coaching PS*), so it would be certainly be the biggest one, so but I am as a result of the course, a bit more confident in doing things (WI).” Only coaches in the MI group described their coaching

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PS skills as ‘extra tools in their coaching kit’ which suggests greater perceptions of competence to coach PS practically and effectively “So that has (PS) become an extra weapon in my armoury (MI)”. Indeed, a coach in the MI group suggested that his/her competence to coach PS flexibly had improved. “If one thing doesn’t work, I’ve got a couple more pieces of information that I can use to try to get to a point where it’s successful for the athlete (MI)”. However, coach B, who experienced too much autonomy and a lack of structure during the MI, had some doubts over her competence to coaching PS, “I still don’t know is that the best way to do it (MI)”

As well as feeling more confident at coaching PS, the MI group made comments about perceiving themselves to be more competent coaches generally; “I think it’s made my coaching a lot more effective for them (MI).” and “I think the impression would be a much more competent coach, well I feel like that anyway (MI).” The WI coaches did not articulate comments about improvements to their general coaching competence.

Relatedness: quantitative results. Coach relatedness (MI mean= 5.41, $SD = 1.02$; WI mean = 5.60, $SD = .90$) was not significantly different between groups at post-test with a trivial effect size ($t(20) = -.45, p = .70, d = -.19$).

Relatedness: qualitative results. As referred to in the interpersonal involvement section above, coaches from the MI group, did feel close to the PF and seemed to benefit from more regular contact than the coaches in the WI group. However, coaches could have benefitted from sharing their learning experiences with other coaches and in turn would have experienced more interpersonal involvement.

I did sometimes feel like it, (I know it’s not the case) it was just me doing it. And I think if I’d, I had kind of like that interaction with another coach that was doing it, it would be like ‘oh yeah well.’ It would have just created a bit more excitement around

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the whole thing for me.....I think it would have just made me feel, a bit more I don't know, involved I suppose (MI).

Coach Understanding of PS. Pre-test ratings of coach understanding of PS were not significantly different between groups (MI mean = .77, $SD = .34$; WI mean = .85, $SD = .24$), with a small effect size suggesting that the online group had greater understanding pre-test $t(19) = -0.59, p = .56, d = 0.27$.

Coach understanding of PS: qualitative results. Both interventions seemed to ensure that coaches clearly understood PS to be 'strategies which could be taught to athletes' at the beginning of the intervention. However, some coaches said that when they first started coaching PS, they did not feel that they had sufficient understanding of PS; "I kind of, I felt a little bit like I was talking about things I didn't truly understand to begin with (MI)". Both interventions seemed to improve coaches understanding of PS "it helped me to understand more (*about PS*) than I would have say two years ago (MI)". The intervention content also assisted coaches, by giving PS a label and more structured understanding of PS as part of their coaching practice.

As previously mentioned, only some of the MI coaches suggested that following the intervention they had a better understanding of the athletes they coached and the mental factors affecting their performances. In addition a MI coach said he began to humanise athletes more whilst coaching "I think it makes you more aware, more aware of being a person, rather than just coaching someone to run quickly, or trying to coach someone to run quickly (MI)."

Discrepancies regarding coaching PS. Coach awareness of discrepancies pre-test were not significantly different between groups (MI mean = 2.49, $SD = .61$; WI mean = 2.17, $SD = .51$), $t(20) = 1.38, p = .18, d = 0.57$) however there was a medium effect size

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suggesting that MI group coaches perceived larger discrepancies than the WI coaches at pre-test.

Discrepancies regarding coaching PS. Qualitative analysis. The intervention facilitated coaches in both groups to reflect on their coaching, “It’s sort of made me think about what I do, and how I deliver things (MI).” and “It’s made me evaluate my process of *the sport* as a coach (MI)”. The coaches in the MI group talked about perceiving discrepancies in their coaching of PS at the beginning of the programme. “I didn’t probably think that I had any of the, any skills to carry it through and so although and you kind of think it’s just a gap in your knowledge (MI).” The discrepancies of the MI coaches seemed to decrease as a result of the intervention. Conversely some of the coaches in the WI group suggested that they experienced few discrepancies and the intervention confirmed what they were already doing.

Probably I realised, you know about halfway through, I probably knew quite a bit about self-talk, even though I hadn’t actually thought about it, like that, I just felt like it was affirming what I was already doing, so you know, so it was a case of just carrying on (WI).

However, coaches in the MI group described the intervention as a developmental experience rather than simply confirming what they already knew.

In contrast, at the end of the intervention, some of the WI coaches described discrepancies between their actual and ideal of coaching PS “It’s made me realise that I don’t do anything like as much as I thought I did around the psychological aspects of the event (WI).” None of the MI coaches made comments about being dissatisfied with the amount of coaching PS which had taken place during or since the intervention.

Table 24.

Summary of qualitative findings relating to the intervention's active ingredients towards to coaching of PS

Active ingredients	Mentoring intervention	Workshop intervention
Coach need satisfaction		
<i>Autonomy</i>	Had choice over content sessions	Had choice over intervention engagement
<i>Competence</i>	Too much autonomy (1 coach)	Too much autonomy (1 coach)
	Increased confidence to CPS	Increased confidence to CPS
	CPS as extra tools	
	Increased flexibility in ability to CPS	
<i>Relatedness</i>	Increased perception of general coaching competence	Wanted more contact with PF
	Close to PF	
	Lacking sharing with other coaches	
Coach understanding of PS	Accurate understanding of PS	Accurate understanding of PS
	Better understanding of athletes	
Awareness of discrepancies	Reflected on coaching	Reflected on coaching
	Perceived discrepancies in CPS at the beginning	Perceived discrepancies in CPS at end of intervention
		Confirmed coaches' previous CPS activities
Coach beliefs of PS	PS can create positive outcomes	PS can create positive outcomes
	PS need to be practised daily	PS can create negative outcomes
	PS critical to athlete performance	Normative expectations prevented CPS
Coach intentions to CPS	Intentions to increase CPS	Intentions to increase CPS
		Intentions to use PS personally
Context	Academic ability of athletes	Academic ability of athletes
	Age of athletes	Age of athletes
	Motivation of the athletes	Motivation of the athletes
	Contact time with athletes	Contact time with athletes
		Coach time to prepare CPS
		Coach-athlete relationship
		Influence of parents
		Good assistant coach

Note: CPS = Coaching of Psychological Skills

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Coach beliefs regarding PS. Coach beliefs about PS at post-test were not significantly different between groups (MI mean= 6.03, $SD = .58$; WI mean = 5.92, $SD = .72$) with a trivial effect size, $t(20) = 0.79$, $p = .44$, $d = .16$.

Coach beliefs regarding PS: qualitative analysis. The MI group suggested that following the intervention they recognised that PS were critical to athletes' performances.

If you'd asked me perhaps, a few years ago what the percentage of physical and mental ability was in a race situation, I obviously would have gone for a 95% mental 5%. I'm thinking now it's perhaps, 45% and 55% mental, perhaps even more (MI).

Another MI coach said, "Mental preparation should be done on a daily basis as anything else. Because at the end of the day, if you haven't got your head screwed on, on the day you've got nothing." Conversely, the WI did not make any statements regarding the importance of PS and made more comments about failing to prioritise PS. For instances one WI coach said;

We did goal setting quite quickly. And you know, it's you know, do I think that I gave goal setting as good a turn as I should have done? No. Probably with guys, I could have gone on to a little more detail and made them focus on it (WI).

Coaches from both groups talked about expecting positive outcomes to be created by coaching PS, "I've seen how once somebody has taken it on board it can be positive so that makes me, that makes me want to do it more (MI)". Yet some coaches from the WI group talked about potential negative outcomes of coaching goal setting, such as emphasising failure, inducing parental frustration and demotivating athlete who are over-contributing to group goals.

I become very conscious about speaking about goals when, I worry about what could possibly be coming back to me in the form of an email from a parent, that I told a kid hadn't done well, or I missed a kid who had done well (WI).

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None of the coaches in the MI group discussed any potential negative outcomes from coaching PS.

Similarly, the WI group mentioned the pressure of normative expectations of athletes and parents reducing the prioritisation of coaching PS. “The kids still expect their session, to be written for the pool, so that means psychology tends to be a bolt on, as supposed to having it be totally and fully integrated into the programme (WI).” And “this year, I think we were incredibly lucky (*due to the weather*) because we spent, most of the time physically *training*. And that’s what most, parents and most squads would expect you to do (WI).” None of the MI group discussed normative pressures during their interviews.

Coach intentions to coach PS. Coach intentions to coach PS at post-test were not significantly different between groups (MI mean = 6.32, $SD = .72$; WI mean = 6.04, $SD = .78$) with a small effect size suggesting that MI group had greater intentions to coach PS than the WI group, $t(21) = 0.38, p = .27, d = .37$.

Coach intentions to coach PS: qualitative analysis. Most coaches in both groups expressed intentions to continue and increase their coaching of PS, “it’s made me think a lot more as you are going into planning for next, starting thinking about planning for next year, with this group (WI)”. Interestingly, one particular coach who had studied goal setting, suggested that he intended to set specific goals to encourage his coaching of PS.

I’ll be giving myself goals as well, and that might be, you know, a) how much contact time I’m spending with them with regards to the goal setting b) how much time I’m reminding them to use goal setting and, you know am I setting goals for myself (WI).

Procedural knowledge. Coach procedural knowledge at follow-up was not significantly different between groups (MI mean = 3.15, $SD = .60$; WI mean = 2.94, SD

The impact of active ingredients on coach behaviour change.

Table 25

Means, Standard Deviations and Bivariate Correlations between PF provided need support, coach need satisfaction, coach beliefs about PS and coach intention to coach PS

Timepoint	Coach Active ingredients	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
Pre-test	1. coach understanding of PS	.81	.28													
Pre-test	2. coach ideal discrepancies	2.32	.56	.16												
Mid-test	3. Mean need support	3.61	.32	-.00	-.02											
Post-test	4. Mean need support	3.45	.47	.39	.26	.21										
Post-test	5. Need satisfaction (autonomy)	5.63	.61	.42	-.18	.00	.58**									
Post-test	6. Need satisfaction (competence)	4.79	1.06	.18	.06	-.10	.57**	.62**								
Post-test	7. Need satisfaction (relatedness)	5.51	.94	-.45*	-.14	-.34	-.07	.14	.02							
Post-test	8. Global beliefs about PS	5.91	.70	.24	-.40	-.40	.23	.53*	.26	.12						
Post-test	9. Intention to coach PS	6.17	.75	.41	-.16	.10	.53**	.61*	.41	-.06	.64*					
Post-test	10. Coaching of PS (CPS-F mean aggregated)	2.01	.61	.38	.16	-.05	.06	-.09	.00	-.24	.07	.26				
Post-test	11. Need supportive coaching of PS (CPS-NS mean aggregated)	2.04	.66	.40	.17	-.04	.03	.09	.11	-.25	.12	.32	.93**			
Follow-up	12. Procedural knowledge of coaching PS (inter rated)	3.05	.49	.42	-.05	.08	.32	.22	.23	-.40	.03	.17	.24	.25		
Follow-up	13. Coaching of PS (CPS-F mean aggregated)	2.19	.58	.47*	.30	-.06	-.00	-.08	-.12	-.38	.09	.24	.89**	.89**	.28	
Follow-up	14. Need supportive coaching of PS (CPS-NS mean aggregated)	2.29	.66	.42	.24	-.04	.05	.04	.03	-.38	.10	.27	.89**	.93**	.33	.96**

Note. N= 22, ** correlation is significant $p < .001$, * correlation is significant $p < .05$, variable 1 was rated on a 0-1 scale, variables 2-9 were rated on a 1-7 scale, variables 10, 11, 13 and 14 on a 0-4 scale and variable 12 on a 1-5 scale.

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= .33), however there was a small to medium effect size, suggesting that the MI had greater procedural knowledge, $t(17) = 0.91, p = .14, d = 0.43$.

Correlational analysis between active ingredients and the coaching of PS. As can be seen in Table 25, the bivariate correlations revealed that mean levels of coach-rated need support were positively correlated with coach need satisfaction (autonomy and competence) at post-test and follow-up. Need support levels were also significantly positively correlated with global beliefs at post-test, intentions to coach PS at post-test and global beliefs about PS at follow-up. Thus need support delivered during coach education was related to the proposed active ingredients of coach behaviour change. There was a positive relationship between coach understanding of PS at pre-test and the coaching of PS at follow-up, perhaps suggesting that those who had a clear understanding of PS increased their coaching of PS. Interestingly, there was also a negative relationship between coach understanding of PS at pre-test and relatedness at post-test, perhaps indicating that the lower coaches' understanding at pre-test, the more interpersonal involvement they received from the PF or the social support they sought.

Context: Qualitative Analysis. There were a number of contextual factors which seemed to influence the effectiveness of the coaching of PS including; the characteristics of the athletes being coached, the coach-athlete relationship and the availability and resources of the coach. The coaches from both groups suggested that an athlete's academic ability could influence their responses to the coaching of PS, particularly when writing down goals or expressing their self-talk. "So people who have difficulties with language may feel that you're challenging them educationally, when maybe the coach might not think they are that's quite difficult, so there's a lot to overcome in that sense (MI)."

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Also coaches in both groups discussed the age of the athletes who received the coaching of PS. Two coaches suggested that their younger athletes found it challenging to control their emotions and express their thoughts to their coaches therefore, “I think it’s affected some athletes more than others, again, some have been more, willing to buy into it, So I think the more, the more mature ones have gotten more from it than the youngsters (MI).” Conversely, some coaches in both groups were in favour of coaching PS with younger athletes, “I think it’s far better, that it would be, for me if would have been introduced from nine-ten years old upwards (MI)”.

Again coaches in both groups suggested that the general motivation of the athletes’ influenced the extent to which they bought into the coaching of PS

I think there are those athletes that are serious realise how important it is. But some of the other athletes just don’t see it ...And that I think, in terms of the engagement of the others I think that’s it’s a whole programme engagement as opposed to specific to the mental skills side of it (MI).

Limited contact time and large numbers of athletes to coach were barriers to the coaching of PS.

The contact time with the athletes. Which is, because myself and *the athlete* are two hours apart and we see each other once, twice a week and I think if we’d been sort of both in *city A* or something like that or *city B* or wherever, and seeing each other most days, if not every day then I think we’d have been further down the line on it (WI).

It was only coaches from the WI, who talked about the lack of planning time and a lack of time to read and seek out further PS info “that (*coaching PS*) should be structured and well planned, I think it can be time consuming. I guess that was kind of a barrier (WI).” One coach in the MI group, suggested due to a lack of time he had needed to prioritise certain athletes to

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coach PS with, “I just always feel like I could do a little more with the athletes and I have to be a bit more specific about who I was going to try and talk to about different things (MI).”

The time of year and season including off periods and the competitive season were barriers to the coaching of PS.

I’m like most coaches, you are sort of reluctant to try and change anything, as you go into the main competition period. You want to try and get that done, sort of big changes done and things. So with either technical or in this case psychological. Early in the training year (WI).

As discussed earlier, obtaining athlete feedback was important for the coaching of PS therefore coach and athlete need to have a trusting relationship. Indeed, one of the WI coaches suggested that there was a lack of transparency in his relationship with one of his athletes, which was hindering the effectiveness of goal setting.

I would say a barrier is, transparency really. Would be the one. To be open and honest with it because you know you can’t. If we are setting a particular goal, to get him fast. And then he runs two race on the same day that you don’t even know about so by the time you get to training on Tuesday. He’s tired and you can’t work out, why he’s tired, you are not going to achieve those goals (WI).

Another contextual factor that coaches suggested influenced the effectiveness of coaching PS was other people (i.e., parents or other coaches).

Because you can educate a kid and the parents spend the other 22 hours of the day with them and totally undoes all your hard work of what your goals should be.

Sometimes, it only takes one comment from a parent to say, ‘you need to, you need to win this race,’ and suddenly they’ve totally changed from a process driven goal to an outcome goal and you know, it totally changes things. So I think that’s an issue (WI).

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On the other hand, one WI coach suggested having that an assistant coach with good technical knowledge had allowed him to focus more on PS whilst coaching.

Coaches in both groups described the advantages of being present during athletes competitions manage external influences and to coach PS.

The difference is because I go to nearly every event, I can still then do the 'headwork' at that event.....in reality it's a case of me, looking them in the eyes and go ok' you're scared, let's work out why you are scared, let's start talking about it now, rather than after the race, when it's too late to do anything about it (WI).

Summary of active ingredients. There were a number of key differences regarding active ingredients experienced by coaches on the two interventions. The MI group's reported more increases related to their perceptions of competence than the WI group, which was likely to be due to greater mastery experiences and positive feedback within the MI. The MI group mentioned improving their understanding of their athletes (something not mentioned by the WI group) which may have been due to the individualised nature of the MI facilitating discussion of specific athletes, followed by the more in-depth questioning of MI coaches. The MI group had greater discrepancies (a non-significant finding with a medium effect size indicating a meaningful difference) regarding their coaching at the beginning of the intervention than the WI group, which is likely to have been established via the facilitated profiling in session 2 (See Table 16 for details). Although the statistical comparisons between coach beliefs did not reveal any between group differences the qualitative results revealed that the MI group discussed PS as crucial to athletes performance group and were less concerned about the potential negative outcomes and normative expectations regarding PS than the WI group. Also the MI group seemed reported more in-depth procedural knowledge regarding coaching PS effectively (a non-significant finding with a medium effect size indicating a meaningful difference). Conversely, there seemed to be little difference between

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the groups regarding their satisfaction of relatedness and autonomy. Interestingly the WI group seemed to have a more accurate understanding of PS at the beginning of the intervention, which may indicate that the delivery on session 1 information was more effective online.

Coach understanding of PS at pre-test was positively related to the coaching of PS however there were no other significant relationships found between the measures of active ingredients and the coaching of PS. Thus, we were unable to establish the relationship between each component of the intervention model to coach behaviour change. However, intervention need support was related to coach need satisfaction (autonomy and competence), beliefs regarding PS and intentions to coach PS, all of which have been shown to influence behaviour change in other contexts (Hagger et al., 2003; Markland & Tobin, 2010). These results suggest that a coaches' experiences of need support on an intervention do influence their cognitions and beliefs regarding the particular coach behaviour(s).

Both groups reported contextual factors similar to those found in the pilot study which facilitated or hindered PS (athlete characteristics, athlete contact time in training and competitions, time of year, coach-athlete relationship, and external influencers). There were no noticeable differences between the groups regarding the occurrence of contextual barriers and the coaches' ability to overcome them, with the exception of WI coaches mentioning more barriers related to a lack of time and parents. Within subsequent PS interventions, coaches may benefit from receiving practical advice surrounding dealing with parents and their effect on athletes PS use.

Summary of chapter findings

To summarise, this study was designed to compare a need supportive mentoring programme to 'usual practice.' The intervention **outcomes** of both interventions were the increased coaching of PS and a range of positive outcomes for athletes and coaches' training.

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Specifically, the MI facilitated the continued coaching of PS and increases athlete awareness of PS to a greater extent than the WI. Coaches in both groups reported unintended coaching outcomes of the intervention namely improvements in; communication; planning; structure and rationale provision and leadership. Results also revealed that the coaching of PS indirectly improves athlete performance via increases in athlete awareness of PS, athlete use of PS in training which then improves athletes' effort and coping in training. Additionally, some coaches reported that the coaching of PS also unintentionally improved the team environments and athletes school work. The results highlight the additional benefits of both a mentoring intervention and current online learning intervention in comparison to an in-situ 2 hour workshop. The current study has also highlighted the positive impact and broad impact that long-term coaching interventions can have and that indeed coaching PS has a positive impact on athletes' training and performance

To summarise the findings regarding the **intervention process**. With regards to coaches intervention experiences; as planned the MI coaches were provided with more need support than WI coaches, however the WI were provided with more support than intended via data collection sessions. The strengths of both interventions were the longitudinal format (rather than a two day workshop) and the flexibility of the PF. The coaches found the WI material accessible and appropriate. WI coaches found to ability to re-watch the material helpful, although some coaches reported IT issues and the material being hardwork. The MI coaches reported that they found the PF's advice and the opportunities for experiential learning useful, however some coaches found the technical terminology and autonomy provided by the PF unhelpful. Furthermore, MI coaches would have liked more discussion with other coaches and more opportunities to watch examples of coaching PS. These findings highlight the facilitative nature of both interventions, and indicate were the interventions could be improved.

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The MI intervention process more effectively impacted on the coach process of change described in the intervention model. Although the levels of active ingredients in each intervention group were not statistically different, there were small to medium effect sizes found indicating meaningful differences between the two groups. These effect sizes are also supported by the qualitative analysis of coach experiences within each group. Indeed, MI coaches reported higher levels of discrepancies, competence of coaching PS, belief in the importance of coaching PS, less negative concerns about coaching PS and greater procedural knowledge to coach PS than the WI coaches. The coach levels of need support provided on the programme were related to coach need satisfaction, coach beliefs about PS and coach intentions to coach PS. However, the model components were not shown to be related to coach behaviours of coaching of PS, therefore the predictive value of the model remains unclear.

These findings support some previously popular notions which have been proposed in the coaching literature. The differences between

Implications

The findings of this study indicate that the MI intervention is an effective coaching PS intervention which assisted coaches to overcome multiple barriers to coaching PS (Callow et al., 2010; Harwood, 2008). The positive results along with the in-depth nature of the intervention description and evaluation will assist researchers and practitioners to replicate its implementation. Thus, it is hoped that these research findings will increase the effectiveness of coaches' PS education and increase the number of coaches delivering PS training. Moreover, given the broad and positive impact of both interventions the results illustrate that the coaching of PS, online coach education and coach need support within coach education warrant further research investigation.

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The current intervention development, design, implementation and evaluation followed the recommendations of the MRC guidelines. As such, this research was more rigorous, theoretically-driven and practically effective intervention than previous coach interventions in the coaching of PS (Callow et al., 2010). Specifically, the use and development of behaviour change theory via the construction of an intervention model assisted the intervention to be theory-driven rather than theory-inspired (Michie et al., 2008). Therefore, this research study should encourage and assist other intervention researchers to utilise theory-based delivery protocols and improve the quality of complex coach intervention research. Finally, the results of this study have initiated the study of coach behaviour change. Further research is needed to refine and confirm the coach behaviour model (developed in Chapter 2 and applied in the current Chapter 4) to establish whether it is predictive of coach behaviour change and whether the model is applicable to alternative complex coach interventions.

Study limitations

The present study has a number of limitations affecting the conclusions which can be drawn. Firstly, there are limitations with the results derived from the qualitative interviews. Given the scale and limited resources of the current study, it was not possible to access an external interviewer to conduct the coach follow-up interviews; therefore they were conducted by the PF who delivered the intervention. Clearly, social desirability effects may have influenced the results. However, there are some benefits to using this approach, as the PF developed a closeness with the coaches being interviewed, which could have enhanced the coaches' ability to be honest and discuss the issues related to coaching PS (Patton, 2002). Furthermore, a 'devil's advocate' assisted the PF to retain a suitable distance from her experiences and her relationships with the coaches whilst analysing the data.

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Another limitation of this study is its quasi-experimental design. As the MRC guidelines (Craig et al., 2008) suggest, in order to truly compare practical interventions, a randomised control trial is preferable. Indeed, there could have been systematic differences between the groups which could have influenced the findings as coaches were allocated to groups based on their location within different regions of the UK. However, there were no significant demographic differences found between the groups at pre-test and no contextual variables based on location which influenced the intervention experiences or outcomes emerged from the qualitative data. Thus any systematic differences between the groups were thought to be minimal.

Another limitation was the relatively small sample of coaches within this study is limited statistical power. However, to deal with a lack of power effect sizes were considered over a sole reliance on significance testing (cf Winter et al., 2014). Furthermore, the sample was made up of elite coaches and athletes participating in a longitudinal intervention, therefore recruitment was satisfactory given the availability of the sample. Moreover, hot deck imputation of missing data (Myers, 2011) was conducted on all the data to minimise the loss of statistical power due to attrition.

Finally, the data in this study were nested, as measures were completed both coaches and the athletes within each coaches group. Whilst the non-independence of data was controlled for within the regression analyses using PROCESS, an investigation using multi-level analysis would have been particularly beneficial to analyse the influence of the active ingredients on behaviour change.

Conclusion

Despite several limitations, the research findings make a significant contribution to coach intervention research by utilising a rigorous approach to the implementation and evaluation of a sport psychology intervention, guided by MRC guidelines for Complex

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interventions. Improvements to the quality of intervention development, implementation and evaluation enabled an effective format for coaching PS interventions to be established.

Finally, given the importance of coaches' role (Durand-Bush & Salmela, 2002) and the limited impact of coach education programmes (Trudel et al., 2010), the study findings have begun an exciting and essential investigation into coach behaviour change.

General Discussion

General Discussion

This chapter draws together the research aims and findings of the three empirical chapters within the PhD. A summary of the main findings from the thesis is presented, followed by a discussion featuring the theoretical and conceptual points of interest arising from the thesis, the research and applied implications, and the strengths and limitations of the thesis. Finally, recommendations for future research directions are made.

Thesis Summary

There were three main aims to this thesis: (a) to utilise a rigorous approach to the implementation and evaluation of a sport psychology intervention, guided by Medical Research Council guidelines for Complex interventions; (b) to extend knowledge regarding the effective facilitation of coach behaviour change; and (c) to establish an effective format for coach interventions to optimise coach provision of PS support for athletes. Chapter 1 provided an overview of the current PhD thesis in relation to coach intervention research. It also featured the key themes which underpinned the research across the thesis, namely: a focus on rigorous coach intervention evaluation; the use of behaviour change theory within coach interventions; and the coaching of psychological skills.

Chapter 2 presented a coach intervention within a challenging and often novel area for coaches; the coaching of PS (Paquette & Sullivan, 2012). Indeed, the purpose of the study was to develop and pilot an effective coaching PS intervention following the suggestions of the MRC guidelines (Craig et al., 2008). As the guidelines suggest, behaviour change theory informed the pilot intervention delivery (namely Self Determination Theory; Ryan & Deci, 2002). The pilot results provided information regarding the intervention's outcomes, feasibility and the active ingredients within the intervention process. We adopted a mixed method approach to intervention evaluation which included evaluating the impact of the intervention at coach and athlete levels. We statistically analysed pre and post-test

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questionnaire data and analysed coach and athlete interviews using a qualitative framework analysis (Ritchie & Spencer, 1994). We then conducted a pattern analysis (Ragin, 2002) to compare processes and outcomes between coaches. The results demonstrated positive outcomes in the coach encouragement of PS, some athletes' use of PS, and some athletes' training behaviours. Additionally, unintended outcomes were also evident (e.g., changes of coach employment and further dissemination regarding PS). Findings from the process evaluation in the pilot indicated that the intervention was need supportive and that SDT was a relevant theoretical framework to inform intervention delivery. The results of pattern analysis highlighted additional mechanisms of coach change alongside need support. As suggested by the MRC guidelines, we mapped out all of the proposed mechanisms of coach change in an intervention process model (e.g., Mosleh et al., 2009) to assist relevant facilitation and evaluation in the subsequent intervention. The components of the intervention model mirrored suggestions of other behaviour change literature including the Precaution-adoption model (Weinstein, 1988), Self-discrepancy Theory (Higgins, 1987) and the Trans-contextual Model of behaviour change (Hagger et al., 2003). As such, the model was aligned to the conclusions of Cushion et al., (2010) that multiple theoretical approaches are relevant to coach development, however it is crucial that coach programme designers are explicit about the theory (or theories) which inform coach delivery. Based upon the pilot study findings and intervention model, multiple improvements were identified for the subsequent intervention in terms of intervention delivery, the measurement of behaviour change and data collection processes.

The findings of the pilot study in Chapter 2 highlighted the need for a more refined and accurate measure of the coaching of PS which could be used in the subsequent intervention study. Therefore, the purpose of Chapter 3 was to develop and validate more detailed measures of coaching PS measures. To guide the measurement development, the

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coach and athlete interviews from Chapter 2 were reanalysed using hierarchical content analysis (Côté et al., 1995) in order to establish the nature of coaching PS. Based on the qualitative analysis, two questionnaires were created, one measuring the frequency of fundamental components of coaching PS (CPS-F) and the other measuring the quality of coaching PS, that is the need supportive coaching of PS (CPS-NS). Following confirmatory factor analysis procedures and item deletion acceptable model fits were established. The CPS-F had a 3-factor structure which included coach observation of PS (watching and noticing athletes' use of PS), targeted cueing of PS (giving athletes instructional or motivational cues to focus attention on helpful stimuli), coach encouragement of PS (instructing and reminding athletes to use PS). The CPS-NS scale (providing explanations of how to use PS and seeking athlete involvement in PS education) was found to have a single factor structure (CPS-NS) mirroring other need support measures (Markland & Tobin, 2010). Initial support for the concurrent, discriminant and predictive validity of the questionnaires were established and both questionnaires were deemed suitable for use in the subsequent intervention featured in Chapter 4.

Chapter 4 was a full-scale intervention implementation and evaluation guided by the MRC guidelines (Craig et al., 2008), informed by the intervention model and other findings of Chapter 2, and using the measures developed in Chapter 3. The study used a mixed-methods between-group design to compare the efficacy of standardised PS workshops delivered online (WI) and a need-supportive coaching PS mentoring intervention (MI) the delivery of which was based on the intervention model created in Chapter 2. The results revealed that the MI had more positive, long-term impact on the coaching of PS and athlete awareness of PS use than the online method. It was also revealed that the coaching of PS indirectly impacted positively on athlete performance via athlete awareness of PS, then

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influencing athlete use of PS in training which then improved athletes effort and coping in training to improve performance.

With regards to the intervention delivery, as intended the MI group experienced more need support than the WI group. However, the coaches who received the WI did experience need support inadvertently, via data collection and the flexibility of online learning. The intervention design seemed to effectively impact on the coach process of change, as MI coaches reported higher levels of discrepancies, competence of coaching PS, belief in the importance of coaching PS, less negative concerns about coaching PS and greater procedural knowledge to coach PS. Although the model components were not shown to be related to coach behaviours of coaching of PS (aggregated athlete reports of the coaching of PS), levels of need support provided on the programme were related to coach need satisfaction, coach beliefs about PS and coach intentions to coach PS.

Theoretical and conceptual issues arising from the thesis

Taking the findings from the thesis in concert, a number of theoretical and conceptual issues are evident. These include the theory driven nature of the intervention, the appropriateness of the intervention model, and the conceptualisation of coaching PS. Each of these issues is discussed in the following section.

A theory driven coach intervention. As suggested by the MRC guidelines, both the pilot intervention and full-scale intervention were informed by theories of human motivation and behaviour. Self-Determination Theory (SDT; Ryan & Deci, 2002) was selected *a priori* to inform the design of the pilot study. Following the pilot study, an intervention model was created featuring emergent and additional coach behaviour change mechanisms alongside need support. The proposed mechanisms of coach behaviour change reflected findings from previous behaviour change research using the Trans-contextual Model of behaviour change (Hagger et al., 2003) and Precaution-adoption model (Weinstein, 1988) and Self-Discrepancy

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Theory (Higgins, 1987). Each of these theoretical approaches is briefly reviewed to provide a rationale as to their appropriateness in the intervention model.

Self Determination Theory (SDT; Ryan & Deci, 2002), a well-established theory of human motivation, was the principal theory of behaviour change guiding the intervention design. SDT proposes that individuals have three innate psychological needs: autonomy (to be the originator of one's behaviour); relatedness (to feel social connections with others); and competence (to feel effective in one's environment). An individual's (such as a coach) basic needs can be satisfied or thwarted by environmental conditions and the satisfaction of these needs is predictive of an individual's intrinsic motivation and autonomous engagement in specific behaviours (Reeve et al., 2004). Furthermore, the extent to which socio-contextual conditions provide autonomy support (the promotion of choice and recognising the perspectives of the learners), structure (making expectations and outcomes apparent and providing clear feedback) and interpersonal involvement (the quality of the relationship between facilitator and learner) corresponds to increases in an individual's need satisfaction which impacts on their motivation and behaviour (e.g., Edmunds et al., 2008; Markland & Tobin, 2010). Within previous coaching PS interventions it seems that need support, and therefore coach need satisfaction regarding the coaching of PS, was likely to be deficient (Callow et al., 2010). Both the pilot study and larger scale intervention in this PhD were designed to satisfy coaches' needs by providing coaches with structure, autonomy and interpersonal involvement. Given previous research regarding coach confidence to coach PS (Callow et al., 2010), the intervention included several mastery experiences (Bandura, 1997), via practice experiences of coaching PS and using graded tasks (easy to difficult) to enhance beliefs about one's capabilities regarding behaviour change (Michie et al., 2008).

The findings of the pilot study highlighted that coach behaviour change was influenced by beliefs about PS. Specifically, coach beliefs about the need to coach PS, others

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expectations (or norms) and their beliefs about the outcomes of coaching PS seemed to influence the coaching of PS. Similarly, various theories of behaviour change, such as the Health Action Process Approach (Schwarzer, 2008) and The Theory of Planned Behaviour (TPB; Ajzen, 1991), propose that an individual's attitudes and beliefs towards specific behaviour(s) can influence behavioural outcomes. Indeed, as suggested by the findings of the research, the combined tenets of SDT (Ryan & Deci, 1985) and TPB (Ajzen, 1991) were thought to be predictive of coach behaviour change (Hagger et al., 2003, Hamilton, Cox, & White, 2012). A combined approach, such as the one proposed by the Trans-Contextual Model (TCM: Hagger et al., 2003) uses SDT to explain how the general environment impacts on behavioural tendencies in that context (e.g., autonomy support leading to need satisfaction and subsequent motivational regulations). Subsequently an individual's motivational regulations influence specific beliefs and attitudes and the TPB (Ajzen, 1991) can help to explain the specific decision making about behaviour change at the situational level (i.e., the individual's specific attitudes, norms and perceived control regarding behaviours which lead to intentions). Indeed, the pilot study results identified that alongside need support, specific coach attitudes towards the outcomes of coaching PS and norms about important others expectations could promote or hinder coach behaviour change, reflecting the behaviour change mechanisms outlined by TCM. Therefore coach beliefs were facilitated via making information regarding positive outcome contingencies of PS more explicit and persuasive (Michie et al., 2008), addressing specific coach concerns about potential negative outcomes and using motivational interviewing principles as a non-judgemental approach to clarifying and enhancing any positive attitudes (Miller & Rollnick, 2002).

Finally, TCM research has found that beliefs (attitudes, perceived control and norms) are predictive of an individual's behavioural intentions (Hagger et al., 2003). However, behavioural intentions do not always translate into behaviour change, commonly referred to

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as the “intention-behaviour” gap (Sheeran, 2002). Examinations of the intention-behaviour gap have suggested that there is a motivational phase where an intention is formed, which is followed by a regulatory phase where a range of strategies are implemented to ensure an intention is realised (Gollwitzer, 1999). An effective regulatory strategy which can clarify procedural knowledge involves making detailed plans to conduct the intended behaviour (Michie et al., 2008; Schwarzer, 2008). Therefore, in the larger scale intervention we aimed to enhance the accessibility of intentions and bridge the intention-behaviour gap by assisting coaches to make their procedural knowledge explicit (i.e., via planning when, where, how to conduct coaching PS and overcome difficulties) -.

Additional elements of the intervention model which emerged from the pilot study were coach understanding and the awareness of coach self-discrepancies. Coach understanding was thought to be the initial step towards coach behaviour change (cf. the Precaution-Adoption Model; Weinstein, 1988), and coach progress was hindered without an understanding of PS. Indeed, a lack of understanding and knowledge about PS has been a commonly cited barrier to the coaching of PS (Gould, et al., 1999; Harwood, 2008). Therefore, a key element of the large scale intervention was to ensure the provision of clear information regarding the nature of PS, followed by the checking of coach understanding regarding PS (Michie et al., 2008).

In addition to coach understanding, self-discrepancies emerged from the pilot study findings and so were included within the coach intervention model. Higgins’ (1987) Self-Discrepancy Theory suggests that discrepancies between actual and ideal (or ought) behaviours can influence an individual’s affect and potentially motivate an individual to reduce such a discrepancy. Furthermore, the identification of discrepancies via reflection or challenge is broadly recognised as a key step towards behavioural change within performance contexts (e.g., Arthur, Hardy & Woodman, 2012; Butler & Hardy, 1992; Gilbert & Trudel,

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2005, Whitmore, 2002.) Therefore a process of coach profiling was used to explicitly assist coaches to identify when the coaching of PS does and does not occur, allowing self-discrepancies to become more apparent.

In summary, the intervention model was used to inform the effective facilitation of coach behaviour within Chapter 4, via activities which promoted coach need satisfaction, coach understanding of PS, coach awareness self-discrepancies in the coaching of PS, positive beliefs about PS, coach intentions to coach PS and coach procedural knowledge.

The Intervention Model. The main aim behind the development of the intervention model was to ensure effective intervention delivery by facilitating the proposed components of coach change within the MI. The results of Study 4 show that via the intervention modelling process the delivery techniques selected to impact on the model components were effective. Indeed, the MI was more effective than the WI as it assisted coaches to understand their athletes, elicited greater coach discrepancies at the beginning of the intervention, facilitated greater coach perceived competence to coach PS, encouraged more positive coach beliefs about PS, and created more in depth procedural than the WI. Furthermore, the results of Study 4 indicate that, as the model suggests, that the components of coach change are interrelated. Need support was related to coach need satisfaction (autonomy and competence), beliefs regarding PS and intentions to coach PS, all of which have been shown to influence behaviour change in other contexts (Hagger et al., 2003; Edmunds et al., 2008; Markland & Tobin, 2010). Crucially, the quantitative and qualitative results of Chapter 4 indicated that the MI design produced more positive outcomes regarding coach encouragement of PS, the need supportive coaching of PS and athlete awareness of PS use. The interventions outcomes combined with more effective facilitation of coach cognitions could imply that the intervention effectively predicted coach behaviour change. However, statistical analyses of the intervention model failed to support the model's predictions, as

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athlete-reported coaching of PS was not correlated with any of the aspects of the model components.

The results from, Study 4 confirm the utility of the intervention model's in informing the delivery of coaching PS interventions. The explicit nature of the model improved the effectiveness of the intervention and should also facilitate more effective replication of the current coaching PS intervention in the future. Furthermore, the research highlights that future coach intervention researchers would benefit from creating intervention models to ensure the more deliberate use of behaviour change techniques within intervention delivery (Michie & Abraham, 2008). However, it is unclear as to whether the intervention model actually predicts coach behaviour change. Therefore, further coach behaviour change research is needed to test and refine the intervention model as a valid and predictive model of coach behaviour change.

The conceptualisation of coaching PS. Alongside the intervention model of coach behaviour change, the results of the current thesis have informed an initial model of coaching PS behaviours. Specifically the model describes the observation of PS (watching and noticing athletes' use of PS), targeted cueing of PS (giving athletes instructional or motivational cues to focus attention on helpful stimuli), coach encouragement of PS (instructing and reminding athletes to use PS) and need supportive coaching of PS (providing explanations of how to use PS and seeking athlete involvement in PS education). Critically, the means via which the coaching of PS occurs are broader than first captured as coach encouragement of PS (Jedlic, et al., 2007). The categorisation seemed to assist the facilitation of the coaching of PS in Chapter 4, as coaches were informed of the different ways they could go about engaging in all four types or behaviour effectively.

Despite the initial supportive results from Chapter 3, further development of the questionnaires is warranted particularly with the coach observation scale. The observation

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scale was derived from coaches suggesting that they watch out for their athletes' use of PS, and athletes reporting their coaches 'pick up on' or give them feedback about their PS. The observation scale was highly correlated with need support scale in Chapter 3, perhaps suggesting that the observation scale could be capturing a higher level behaviour more akin to need supportive coach feedback than a fundamental behaviour of coach observation. Therefore, the observation scale would benefit from further development and investigations into the potential impact of observation and feedback provision to athletes regarding PS.

Implications

There are numerous implications that can be drawn from the current thesis, and this section focuses on areas for research consideration, the coaching of PS and complex interventions within sport, along with the applied implications of the research.

Coaching PS research. Given the well-known benefits of psychological skill training (See Williams, 2010 for an overview) and the limited access to PS training provision, there is need for further research into coaches' delivery of PS. The majority of previous coaching PS research has solely investigated coach perceptions of coaching PS (e.g., Edwards et al., 2012; Harwood, 2008; Hall et al., 2007) and there has been little to no assessment of the impact of coaching PS on athletes. Furthermore, prior to this research being conducted no valid measures of coaching PS existed, and the results of coaching PS interventions which have been implemented have been equivocal (Callow et al., 2010; Edwards et al., 2012; Harwood, 2008). The empirical studies within this thesis have taken the steps to address the quality of coaching PS research to assist future research. The empirical studies have created a behavioural framework of coaching PS and have provided two valid measures of PS. The behavioural framework (including coach observation of PS, targeted cueing of PS, coach encouragement of PS and the need supportive coaching) provides clear direction for researchers and coach educators regarding the principal components of coaching PS.

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Furthermore, the creation of validated measures of the coaching of PS is expected to facilitate more robust future investigations into the coaching PS.

This research has also demonstrated the value of training coaches to deliver PS. The coach PS interventions herein facilitated a host of positive coach and athlete outcomes (e.g., improved planning of coaching sessions, more supportive coaching, improved athlete awareness of PS, improved athlete use of PS, more focused training, better team environment and better athlete performances). Not only has this research demonstrated the positive impact of coaching PS but the process via which the positive outcomes are reached has been made transparent, increasing the likelihood of effective coach PS education in the future.

Complex Coach Intervention research. Coaching is a highly complex social activity which depends on contextual variations of coaches, athletes and the environment (Cushion, 2007). Indeed, the complex nature of coaching is likely to have been a contributing factor in the dearth of empirical coach interventions (Cushion & Lyle, 2010). In light of such complexity, conducting coach interventions which can comprehensively impact on coaching outcomes in different contexts and then be replicated is a challenging endeavour. Moreover, coach interventions which have been conducted have generally overlooked the complexity involved in intervening with coaches, largely ignoring evaluations of the process of change and the unintended outcomes created. The results of this thesis suggest that utilising the MRC guidelines to frame coach interventions research can assist researchers to account for such complexity. Indeed, by using suggestions of the MRC guidelines, the effectiveness of the current intervention research was improved. The guidelines encouraged a thorough intervention development phase, incorporating behaviour change theory and past research findings to inform the intervention delivery, piloting the intervention and creating an intervention model which all contributed to optimising the full-scale intervention. Furthermore, an accurate representation of the interventions practical effectiveness was

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established using a mixed methods approach and evaluating both intended and unintended outcomes. Finally, the completion of a thorough process evaluation led to detailed information being obtained regarding intervention delivery, enhancing the likelihood of effective intervention replication. Therefore, use of the MRC guidelines within this PhD provides an example of improved rigour within complex coach intervention, assisting future researchers to do the same.

Applied implications. There a number of applied implications which arise from the research associated with future coach PS training, and more generally coach education. The PhD research provides an example of effective coach training in PS and it is hoped that practitioners and coach educators will be able to replicate the intervention delivery in applied settings. Further, the results of all three empirical chapters highlight that PS training can be effectively delivered by coaches and need not be the sole domain of the Sport Psychologist. Indeed, the results indicate that coaching of PS is worthy of greater investment. There will be a clear economic benefit of coach provision of PS as the availability of coaches is greater and cost of coach delivery of PS is lower than that of Sport Psychology practitioners. It is therefore hoped that the coaching of PS will become more commonplace and will be of benefit to athletic performance.

Much of past coach education provision has been criticised due to a lack of evidence that it actually enhances coaching behaviour on the field (Abraham & Collins, 1998; Gilbert & Trudel, 1999; Nash & Sproule, 2012). As such, the current PhD research underlines the benefits of need supportive environments in coach education and as such programmes could be more effective if they were designed specifically to coaches' needs. More generally, the findings from this PhD should encourage coach educators to adopt a behaviour change approach to programme delivery rather than simply aiming to provide coaches with information (cf. Cushion et al., 2003). To benefit from a behaviour change approach, this

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research supports the suggestions of Cushion et al., (2010) and Langan et al., (2013) that coach educators should be explicit about the theory underpinning programme delivery. The transparent use of theory would then assist to improve the effectiveness of coach education provision by targeting the active ingredients of behaviour change.

Strengths of the thesis

The main strengths and limitations related to each empirical chapter have been discussed in their respective chapters. Therefore, the current discussion summarises the strengths and limitations of the thesis as a whole.

A clear strength of this thesis is the novelty of approach within the coaching literature. It is the first time behaviour change theory has been explicitly applied and evaluated in a coach intervention. Further, the notion that the process of coach behaviour change and how it is facilitated requires investigation is novel. It is the first time that the MRC guidelines have been utilised to guide a Sport Psychology intervention, to improve the quality of intervention research. Indeed the benefits of intervention modelling (Hardeman et al., 2005) for coach interventions have been highlighted for the first time. It is also, to the best of the author's knowledge the first time two methods of coach education have been rigorously compared, (as opposed to comparison against a placebo control) and this thesis is the first to produce a factorially valid scale of coaching PS.

Another strength of the research programme is the variety of research methods implemented, as a range of statistical and qualitative analyses were used demonstrating a broad and in depth piece of research training. The qualitative analyses within the thesis utilised a thematic framework approach (Ritchie & Spencer, 1994) in order to evaluate intervention processes and outcomes and hierarchical content analysis (Côté et al., 1995) in order to establish the nature of coaching PS for questionnaire development. To validate the questionnaires, confirmatory factor analysis with maximum likelihood estimation was

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utilised. Further, MANOVAS and discriminant function analysis were used to establish the discriminant validity of the questionnaires developed. To analyse the impact of coaching PS on athlete outcomes a regression-based approach to serial mediational analysis was adopted using PROCESS. In addition, the data analysed within the mediation analysis had the benefit of being longitudinal in nature (between post-test and follow-up) and any potential effects associated with the nested nature of the data (within groups of athletes coached by each coach) were controlled for in the analysis. Further research training was acquired during the large-scale intervention in Chapter 4 regarding missing techniques in order to account for athlete and coach attrition.

As previously noted, a mixed method approach to intervention evaluation was adopted, combining the qualitative findings with the quantitative findings of the interventions which were analysed using ANCOVA, *t*-tests and correlations. As advised by the MRC guidelines, the mixed methods approach can strengthen findings via triangulation (Jick, 1979) and combine findings based on differing philosophical assumptions. Alongside the use of mixed methods approaches to analysis, data from a variety of sources were obtained to avoid an over reliance on self-reported data. Specifically, we collected athlete reports of the coaching of PS, informant ratings of athlete training behaviours, and coach ratings of athlete performance, thus avoiding common method variance issues that can result from the sole reliance on single source data.

The final strength of this thesis was the opportunity to develop applied sport psychology consultancy skills and contribute to Welsh Sport. For the purposes of the thesis research it was necessary to develop the skills to interact with a range of national governing bodies and coaches, ensure a needs supportive delivery of PS education and develop innovative and useful online learning materials for coaches. The interventions delivered have

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had a positive impact on the coaches and athletes involved and it is hoped that the outcomes created have a continuing legacy.

Limitations of the thesis

There are several limitations within this thesis including the lack of objective behavioural data, the lack of multilevel analysis, the potential social desirability effects and the practical implications of applying the research findings. Within the mixed methods approach obtaining observational data of coaching and objective performance data of athletes could have strengthened this thesis and extended our understanding of coaching PS. This however was not possible given the resources available, the multiple sports involved and the scale of data collection already taking place.

In both the pilot and the large scale interventions social desirability effects and Hawthorne effects (Adair, 1984) could have influenced the outcomes reported. Indeed, within the pilot intervention, there was no control group and within the larger intervention the MI coaches spent substantially more time with PF than the WI coaches. However, when considering the practical value of an intervention, Hawthorne effects can still be meaningful as they are still real changes for participants which could be replicated (Craig et al., 2008). Furthermore, the results found within the current studies are unlikely to be solely Hawthorne effects or desire to please the PF for a number of reasons. First, following the interventions, the interviewed coaches reported multiple processes of coaching PS and discussed athletes' use of PS in detail. Without significant learning regarding PS having taken place during the intervention, they would have been unlikely to be able to communicate in such depth about PS. Second, once the PF left the environment (after post-test data collection) it would be expected that any Hawthorne effects would diminish, however the findings suggested that MI coaches continued to increase their coaching of PS without the presence or intervention from the PF.

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Another limitation was that multi-level analysis was not employed in any of the current studies. Multi-level analysis allows the simultaneous examination of group-level and individual-level variables on individual level outcomes (Diez-Roux, 2000) and as such, the understanding of the impact of coach behaviour on athlete outcomes is limited if statistical analyses fail to incorporate coach-level with athlete-level processes. However, this was not possible within the current data due to level 2 sample size issues (i.e., coach numbers). Whilst there is no wide agreement on what this level 2 n should be, the minimum requirement suggested in the literature is 30. However, more conservative proposals have suggested, for some analyses a level 2 n of 100 is required (Hox & Maas, 2001), which was clearly not possible within the current research. To minimise the impact of the nested nature of the data, the group level effects were controlled for within the process analysis, via use of the cluster function.

A final limitation of the thesis is the viability of applying the findings and replicating needs supportive coach education. The time, cost and expertise required to replicate the intervention featured in this thesis are not insignificant and the trialling of more efficient ways of facilitating coach behaviour which will be accessible to a wider range of sports and coaches is required.

Future directions

This section highlights specific future research questions emanating from the thesis. In the studies presented, coaching PS is shown to consist of at least four different types of behaviour and the coaching of PS impacts on performance via athlete awareness, athlete use of PS and athlete training behaviours. There were a variety of unintended outcomes created from need supportive coaching PS interventions predominantly related to enhanced coach planning and reviewing processes, improved communication between coaches and athletes, coaches improved leadership and support of other coaches and an improved social

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environment. The research programme highlights that coach behaviour change can be optimised via a need supportive process designed to: impact upon coach understanding; to elicit discrepancies; to encourage positive beliefs regarding the coaching of PS and to facilitate the implementation of planning in relation to the coaching of PS. However, coach opportunities to watch and model the coaching of PS and the creation of communities of practice were suggested as ways to further enhance coach behaviour change in the current context. There were also a number of contextual factors which coaches suggested influence the coaching of PS, including the quality of coach-athlete relationships, the time available, the ages of the athletes and the external influencers. Based on these findings there a wide variety of future research directions related to the coaching of PS and the nature of coach behaviour change that can be forwarded.

The coaching of PS.

1. *What are the moderators influencing the effectiveness of coaching PS?* In both the pilot and large scale intervention, contextual factors and coach and athlete characteristics seemed to influence the coaching of PS and its effectiveness. Therefore, a key next step in progressing knowledge of coaching PS and PS education is to investigate some of the key moderators of the relationship between coaching PS and athlete outcomes. From the current research it could be suggested that the coach-athlete relationship, coaches' communication style and the coaches' ability to ask effective questions are likely to influence the extent to which the coaching of PS is effective. In answering the question of moderation, future PS training will be able to assist coaches to lay to optimal foundations in order to coach PS effectively.

2. *What is the longitudinal and situational nature of effective coach facilitation of PS?*

Having established an initial model of coaching PS, more research is needed to understand the effective coaching of PS. In particular, more research focusing on the

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occurrence of coaching PS over time, athletes' experiences of the coaching of PS and what actually are the most effective practices to assist future PS interventions. Further research would assist to establish whether there is an optimal way for a coach to introduce PS, in what order PS should be introduced and the best times for coaches to integrate PS into their coaching.

3. What is the nature and influencers on a coach's theory of athlete minds?

Within the thesis qualitative findings coaches suggested that following their participation in the intervention they understood their athletes more and began to realise that they were coaching people who all thought in different ways. Indeed, extensive psychology research has been conducted on an individual's 'theory of mind' or the ability to impute mental states to the self or others (Premack & Woodruff, 1978). Our theory of mind assists us to explain and predict our own behaviour and the behaviour of others (Moore & Frye, 1991). However, research suggests that an adults' theory of mind is not as comprehensive as first thought and there are flaws in our ability in interpreting the actions of others (Keysar, Lin, & Barr, 2003). Indeed, coaches reported that their theory of mind regarding each of the athletes they work with was enhanced by engaging in the coaching of PS intervention. Indeed, an accurate theory of mind whilst coaching an athlete is likely to be a powerful tool in building effective coach-athlete relationships (Jowett & Cockerill, 2003) and tailoring coaching to individual's preferences (Chelladurai & Carron, 1981). Therefore investigations into the accuracy of a coach's theory of mind and how an accurate theory of mind can be best facilitated and utilised, would be an exciting direction of research, which could assist in underpinning current coaching models.

The nature of coach behaviour change.

4. Is the coach behaviour change intervention model applicable to other coach interventions? An important next step for the research with this thesis to refine, test and

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validate the intervention model to understand whether it is a valid model of behaviour change which can be applied to other contexts.

5. *What are the critical incidences of coach change?* Alongside the refinement of the intervention model, an interesting avenue of current research would be to establish the critical incidences of change which cause a coach to alter his/her practice. This research could be done both using a qualitative phenomenological approach and then also adopted as part of coach intervention evaluation.

Conclusion

In conclusion, the current thesis has established an effective format for coach PS training, which could enhance coach development and athlete outcomes regarding PS. The research studies utilised a rigorous approach to the implementation and evaluation of a sport psychology intervention, guided by Medical Research Council guidelines for Complex interventions. This approach assisted in improving the delivery and outcomes of a coaching PS intervention as well as promoting future intervention replication. The introduction of the MRC guidelines should assist future researchers to deal with the complexity of coach interventions and produce more rigorous research which is more easily replicated. Finally, this PhD thesis has begun the investigation into the process of coach behaviour change which provides an exciting and necessary direction for future research.

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Appendix A

COACH ENCOURAGEMENT OF PERFORMANCE STRATEGIES

Name _____ Age _____ Gender M F

Sport _____ Events _____

Years participating in sport _____

Today's Date _____

Current performance level (circle one):

International National Collegiate Regional Junior National Club Recreational

Other _____

This questionnaire measures performance strategies which your coach encourages you to use in various sport situations. Because individual athletes and coaches are very different in their approach to their sport, we expect the responses to be different.

We want to stress, therefore, that there are no right or wrong answers. All that is required is for you to be open and honest in your responses.

Throughout the questionnaire, several terms are used which may have different meanings for different individuals. Because of this, these terms are defined below with specific examples to sport where appropriate.

Please keep these definitions in mind when responding to items with these terms.

A TECHNIQUE: a method which is used systematically and intentionally

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

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

PERFORMANCE: an athlete's execution of specific sport skills during training and competition.

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

WORKOUT: a structured practice session to work on various elements of the sport you coach.

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

Each of the following items describes a specific situation that you may encounter when your coach is working with you during training, preparing for competition or whilst competing. Please rate how frequently these situations apply to you on the following scale:

- 1 = Never
 2 = Rarely
 3 = Sometimes
 4 = Often
 5 = Always

Please put a circle around your answer

	Never	Rarely	Sometimes	Often	Always
1) My coach encourages me to set realistic but challenging goals for practice.	1	2	3	4	5
2) My coach encourages me to say things to myself to help my practice performance.	1	2	3	4	5
3) During practice my coach encourages me to imagine successful past performances.	1	2	3	4	5
4) My coach encourages me to use strategies to prevent my attention from wandering during training.	1	2	3	4	5
5) My coach encourages me to practise using relaxation techniques at workouts.	1	2	3	4	5
6) During competition my coach encourages me to set specific result goals for myself	1	2	3	4	5
7) My coach encourages me to rehearse my performance in my mind before practice	1	2	3	4	5
8) My coach encourages me to use practice time to work on my relaxation technique	1	2	3	4	5
9) My coach encourages me to use self-talk effectively during practice.	1	2	3	4	5
10) My coach encourages me to imagine my competition going exactly the way I want it to go.	1	2	3	4	5
11) My coach encourages me to have specific cue words or phrases that I say to myself to help my performance during competition.	1	2	3	4	5
12) My coach encourages me to evaluate whether I achieve my competition goals.	1	2	3	4	5
13) My coach encourages me to set very specific goals for competition.	1	2	3	4	5
14) My coach encourages me to say things to myself to help my competitive performance.	1	2	3	4	5
15) At competitions, my coach encourages me to rehearse the feel of my performance in my imagination.	1	2	3	4	5
16) My coach encourages me to manage my self-talk effectively during competition.	1	2	3	4	5

	Never	Rarely	Sometimes	Often	Always
17) My coach encourages me to set goals to help me use practice time effectively	1	2	3	4	5
18) At practice, when I imagine my performance, my coach encourages me to imagine what it will feel like.	1	2	3	4	5
19) My coach encourages me to set personal performance goals for a competition.	1	2	3	4	5
20) My coach encourages me to motivate myself to train through positive self-talk.	1	2	3	4	5
21) My coach encourages me to focus my goals on winning results during competitions.	1	2	3	4	5
22) My coach encourages me to talk positively to myself to get the most out of practice.	1	2	3	4	5
23) My coach encourages me to have very specific goals for practice.	1	2	3	4	5
24) My coach encourages me to imagine my competitive routine before I do it at a competition.	1	2	3	4	5
25) My coach encourages me to talk positively to myself to get the most out of competitions.	1	2	3	4	5
26) My coach does not encourage me to set goals for practices, I just go out and do it.	1	2	3	4	5
27) My coach encourages me to rehearse my performances in my mind at competitions.	1	2	3	4	5
28) At practice, when I imagine my performance, my coach encourages me to imagine watching myself as if on a video replay.	1	2	3	4	5
29) At competitions, when I imagine my performance, my coach encourages me to imagine seeing what I would see if I were actually performing (as if I was wearing a head camera).	1	2	3	4	5
30) My coach encourages me to use relaxation techniques as a coping strategy at competitions.	1	2	3	4	5
31b) My coach encourages me to focus my goals on achieving tangible results during training.	1	2	3	4	5
32) During training sessions my coach encourages me to use relaxation techniques to improve my performance.	1	2	3	4	5
33) My coach encourages me to use relaxation techniques during competitions to improve my performance	1	2	3	4	5
34) My coach encourages me to set training goals based on my individual performance.	1	2	3	4	5
35) If I start to "lose it" at a competition, my coach encourages me to use a relaxation technique.	1	2	3	4	5

	Never	Rarely	Sometimes	Often	Always
36) My coach encourages me to relax myself before competition to get ready to perform.	1	2	3	4	5
37) My coach encourages me to use workouts to practise relaxing.	1	2	3	4	5

Appendix B

Please answer the questions according to your experiences on the programme so far. Please indicate how true each of the phrases below are to you.

Please give honest responses, your responses will **remain anonymous and confidential**.

The <i>coaching minds</i> mental skills programme sessions.....	Not true of me				Very true of me
Take into account my individual needs.	0	1	2	3	4
Give me good advice.	0	1	2	3	4
Make it clear to me what I need to do to get results from coaching mental skills.	0	1	2	3	4
Give me information and exercises that are suited to my coaching.	0	1	2	3	4
Encourage me to take my own initiative.	0	1	2	3	4
Consider my needs as a coach.	0	1	2	3	4
Help me to feel confident about my coaching.	0	1	2	3	4

The programme organisers.....	Not true of me				Very true of me
Make time for me even though they are busy	0	1	2	3	4
Make me feel like I matter to them	0	1	2	3	4
Are concerned about my well-being	0	1	2	3	4
Look out for my interests	0	1	2	3	4
Care about my coaching	0	1	2	3	4

Appendix C

Date:

Location:

Psychologist's Autonomy Support							
Relies on Extrinsic Motivational Resources - Incentive, consequences - Directives, Deadlines - Makes assignments - Seeks compliance	1	2 7	3	4	5	6	Relies on Intrinsic Motivational Resources - Interest, Enjoyment - Challenge - Competence/confidence - Choice making
Controlling Language -Controlling, Coercive -Should, must, have to, go - Pressuring, rigid, no nonsense	1	2 7	3	4	5	6	Informational Language -Informational -Flexible -Not at all controlling
Neglects Value, Importance Of session/task/behaviour - Neglects value, meaning, use, benefit importance	1	2 7	3	4	5	6	Identifies Value, Importance, of task/lesson/behaviour -Identifies value, meaning, use, benefit, importance "This is important because..."
Reaction to Negative Affect/Responses: Is not OK: Change it -Neg. Affect is unacceptable -Tries to fix, counter or change something else	1	2 7	3	4	5	6	Reaction to Negative Affect/Responses Is OK: Listens and accepts - Listens carefully - Open to complaints - Accepts as OK, valid reaction

Psychologist's Involvement						
Seems cold and closed -Business like Doesn't enjoy the time with the coach	1	2 7	3	4	5	6
Withholds personal resources -Time, attention, energy	1	2 7	3	4	5	6
Physical Proximity: Distant -Keeps distance -Stays standing up while presenting -A lack of eye contact	1	2 7	3	4	5	6
Knows the coach: No, not at all -no mention of names, academic/personal histories	1	2 7	3	4	5	6
Psychologist's Structure						
During Introduction/directions - Absent, confusing, Unclear, Complicated - Rules, procedures are confusing, absent - Little or No organisation	1	2 7	3	4	5	6
Low, easy workload - Little challenge, slow pace - Asks for only small capacity	1	2 7	3	4	5	6
Scaffolding is fully absent -lack of hints, clues and tips -questions missed, answered poorly	1	2 7	3	4	5	6
During Feedback, post-performance commentary: -None, ambiguous -Off-task, rambling	1	2 7	3	4	5	6
Seems warm, open - Expresses affection, caring - Does enjoys time with Subjects						
Invests Personal Resources - Time, attention, energy						
Physically Proximity: Close -Stands near/sits close - Gives lots of eye contact						
Knows the coach: Yes, detailed knowledge -knows names, academic/personal histories						
Clear, predictable, understandable, detailed - Clearly stated procedures - Frames upcoming lesson well - Clear organisation						
High, Hard workload - Much challenge, fast pace - Asks for full capacity						
Scaffolding is richly present - Hints, clues, tips, reminders - Answers questions well, fully						
Skill-Building Informative, Instructive						

Appendix D

Coach and Athlete interview guides (Chapter 2)

Coach Interview guide

Hi (.....), I'm XXX and I'll be interviewing you today. As Rosie should have explained to you, the purpose of this interview is to evaluate the Sport Wales psychological skills programme run by Rosie Poynor, which you participated in. This interview should last about 1 to 1 1/2 hours and if it's ok with you, I would like to record it.

Again, as Rosie should have mentioned the interview will be made up of five sections, covering 1) your background 2) your experience at each stage of the programme, in particular your **confidence and motivation** to teach psychological skills 3) the programme's impact or lack of impact on your coaching and the athletes you work with. 4) your opinion of the programmes strengths and weaknesses 5) Rosie's interaction with you throughout the intervention.

Some of the questions I will ask you may seem a little repetitive as the team wish to gather detailed information about *EACH* stage of the intervention.

Other than carrying out these interviews I have no attachment to this programme or the staff who worked with you. I am not a Psychologist. I have been employed to carry out these interviews because my opinion of the programme and your answers will be entirely neutral. I will not be judging you on any of your answers. The team are keen to improve the programme as much as possible, therefore please feel free to respond honestly and please don't feel obliged to give particular responses based on what you think the team would like to hear.

Also you may see me write one or two things down early on in order to remember and refer back to later on in the interview.

Stop me at any point if you would like to take a break, and please ask for clarification if anything is not clear.

Do you have any questions before we start?

rm-up questions

First of all, I would like to talk about your background, before we discuss your experiences on the programme...

1) First of all, the words 'Psychological Skills' can mean lots of things to different people, what do the words 'psychological skills' mean to you?

That's really interesting.

Just to make sure you understand my questions, when I use the word psychological skill in this interview, I will be referring to mental strategies or techniques that can be used to facilitate performance and a positive approach to competition.

Skills such as;

Imagery

Goal setting

Relaxation

Self-Talk

1) How, if at all, have you used psychological skills previously as an **athlete**?

(IF YES USE PROBES)

Probe- Which specific psychological skills have you used?

Probe- In what circumstances have you used psychological skills?

Coaches can also enhance their performance as a coach, by practising psychological skills themselves.

2) How, if at all, have you **used** psychological skills personally whilst coaching **prior** to starting the programme?

(IF YES USE PROBES)

Probe- Which specific psychological skills have you used?

Probe- In which circumstances did, or do you use psychological skills?

3) How, if at all, have you **used** psychological skills in **other aspects of your life** before beginning the programme?

(IF YES USE PROBES)

Probe- Which specific psychological skills have you used?

Probe- In which circumstances did, or do you use psychological skills?

Thank you for that information. Your background in psychological skills is of interest to the team, as the programme you participated in was intended to be a psychological skills scheme for coaches. We are now going to discuss each stage of the programme and discuss some of the things that you did and your thoughts about the learning experiences that you may or may not have had.

Procedural processes during the programme:

Critical intervention points, behaviours throughout the intervention and motivation

Programme introduction

- "Think back to when you first heard of the programme.

1) How did you hear about the programme?

As all coaches are different, we are interested in your reasons for getting involved in the programme. For example, some coaches might get involved as a way of improving their coaching, other coaches might get involved to help or satisfy other people, other coaches may begin the programme because they like learning new things

2) What reasons motivated you to get involved in the programme?

Probe: why did you want to be involved? What attracted you to the programme?

3) What, if any goals did you want to achieve by participating on the programme?

Interviewer NOTES down (to use for question 74)

4) Was there anything that had the potential to put you off participating?

Now we are going to discuss what you can remember of your experiences on the programme stage by stage. To remind you of the process, here's a **diagram** of the programme explaining the different stages you might have gone through during the programme, although not all coaches completed every stage. (*Interviewer shows this and talks through the particular stage*).

“Think back to your first session (or sessions) with Rosie, when you met her and she watched you coaching.

5) Can you describe anything you remember about this first meeting and the observation session?

6) Tell me about the impact, if any, being observed coaching had on you?

Probe: what effect, if any, did being watched by Rosie, have on your coaching?

7) What were your thoughts about the programme, based upon this first meeting with Rosie?

The purpose of this session, was for Rosie to introduce herself and for her to increase her understanding of the environment that you coach in and the type of athlete you coach.

8) What, if anything could have improved the usefulness of this first session?

2nd Session Profiling sessions:

“Think back to the profiling session with Rosie. Again, to remind you of the process, here's a diagram of the programme. During this session you should have completed a questionnaire and brainstormed to create a profile or ‘wish list’ of psychological skills (*the interviewer shows the interviewee, the questionnaire and the profile format*).

9) Describe what do you remember about the process of filling out the coach encouragement questionnaire?

10) What were your thoughts about the brain storming exercise you did with Rosie?

11) Which psychological skills did you want to focus on?

12) Why were these skills of interest to you?

13) What if anything, did the profiling session (questionnaires, brainstorming, creating wish list) make you think about?

14) How if at all, did you want to change your coaching behaviour following the profiling session?

The purpose of the profiling session was

- to explain to you what psychological skills are

- to establish which psychological skills you taught during your coaching already
- to create a profile in order to decide what you were going to work on during the programme.

15) In your opinion, how could this profiling process have been improved?

3rd session: Coach and athlete questionnaires

“We have already talked about the coach encouragement questionnaire, now think back to the times when you and your athletes completed the *other* questionnaires both at the early stages of working with Rosie and when you had finished working with Rosie (*interviewer shows interviewee the questionnaires*). These questionnaires were about your athletes training behaviours, your encouragement of psychological skills, coach confidence to teach psychological skills and athletes psychological skills use).

First let us discuss the questionnaires YOU personally filled in.

16) What were your initial thoughts about the questionnaires you filled in?

Probe: questionnaires at the beginning of the programme?

Probe: questionnaires at the end of the programme?

17) What if anything, might have influenced your responses on the questionnaires?

Probe: questionnaires at the beginning of the programme?

Probe: questionnaires at the end of the programme?

18) What barriers, if any, to filling out the **coach** questionnaires did you experience?

19) When you filled the questionnaires in, what if anything, did filling out the questionnaires make you think about with regard to your coaching?

Probe: questionnaires at the beginning of the programme?

Probe: questionnaires at the end of the programme?

Now, I would like to ask you about the questionnaires YOUR ATHLETES filled in.

20) What were your thoughts about asking your athlete's to fill out questionnaires?

Coaches often found it difficult to return their athlete questionnaires.

21) What barriers if any, to your athletes filling out the questionnaires did you experience?

Probe: questionnaires at the beginning of the programme?

Probe: questionnaires at the end of the programme?

22) In your opinion, how might the process of collected questionnaire data be improved?

4th Session: Information session

Think back to the psychologist led information phase, in which Rosie conducted sessions which involved delivering information and activities regarding psychological skills

23) What, if anything was useful about the information Rosie provided you with?

24) What, if anything would you change about the type of information Rosie provided you with?

25) What if anything, did the information phase make you think about?

26) What if anything, did the information phase encourage you to change with regard to your coaching?

The programme intended to give coaches some first hand experience of using psychological skills before teaching them to their athletes.

27) Did you try using psychological skills **yourself** based on Rosie's information?

Probe: Which psychological skills did you try?

IF DID TRY: 25b) What was your own personal experience of using psychological skills?

28) What, if anything would improve the way you received information regarding psychological skills?

5th Session: Planning session (some coaches may not have done this session)

Following Rosie giving you the information, do you remember doing any planning with Rosie, in which she assisted you in creating a plan to encourage your athletes to use psychological skills?

If YES continue

IF NO PLANNING TOOK PLACE go to Booklet 2

28) To what extent was a useful plan to teach your athletes psychological skill constructed during this phase?

29) What, type of doubts did you have about putting the plan into practice?

Probe: What factors might have caused these doubts?

30) What, if anything, would improve the way you and Rosie planned the teaching of psychological skills to your athletes, to make it more useful to you?

6th Session: Rosie observing teaching of Psychological skills

Following the planning phase, do you remember any times when Rosie observed you encouraging your athletes to use psychological skills.

If YES continue,

IF NO OBSERVATION TOOK PLACE go to booklet 3.

Think back to those session(s) when Rosie observed you teaching or encouraging the use of psychological skills.

31) Describe what you taught your athletes about psychological skills for the first time whilst being observed?

Probe: Which psychological skill or skills did you focus on?

32) What was it like with Rosie watching you do this?

33) What, if any, feedback did you receive?

- from Rosie
- from your athletes

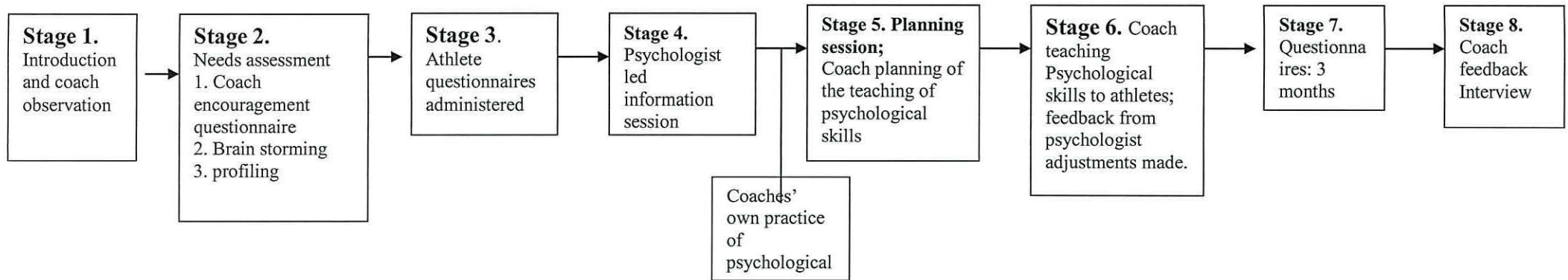
If feedback received - How did any feedback you receive influence your teaching of psychological skills?

34) What if anything, did you learn from your first experience of teaching of psychological skills?

35) Were there any downsides to doing this session with your athletes?

36) What if anything, could be improved for future coaches regarding this observation and feedback session?

Confidence Summary



As I mentioned at the beginning of the interview we are interested in coaches' **confidence** to teach their athletes psychological skills. Teaching psychological skills is often an unfamiliar topic for coaches, and different experiences during the programme can cause their confidence to teach psychological skills to increase or decrease.

37) At the beginning of the programme, could you describe to me your level of confidence to **teach** psychological skills to your athletes?

Probe: How did you feel about your ability to successfully teach psychological skills?

36) Using the timeline above as a guide, could you talk me through any changes in your level of confidence to **teach** psychological skills to your athletes throughout the programme?

Probe: e.g, how, if at all did your confidence change after the information session?

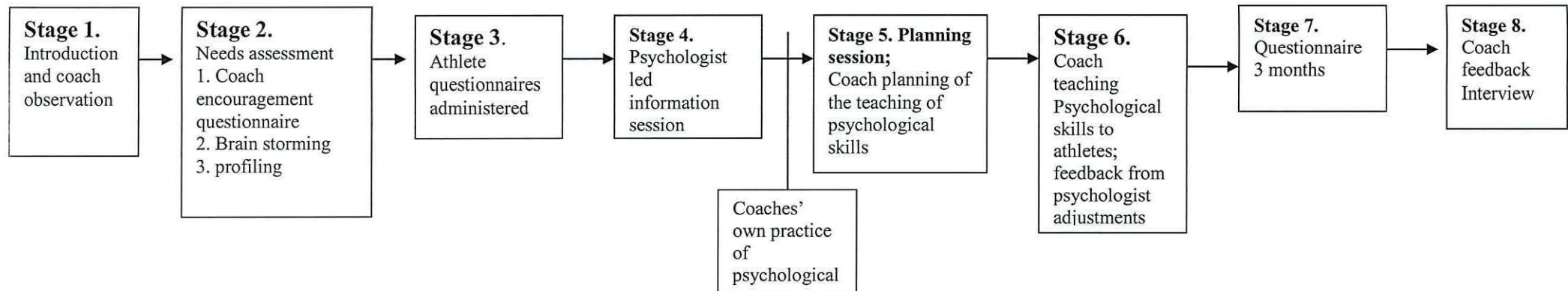
37) If your confidence changed, what do you think caused your change in confidence?

38) Tell me about your current confidence in your abilities to teach psychological skills to your athletes

Probe: To what extent do you feel able to teach your athletes psychological skills?

39) How might the programme be improved to help coaches feel more confident teaching psychological skills?

Motivation Summary



I also mentioned at the beginning of the interview we are interested in coaches' **level of motivation** to teach their athletes psychological skills, as coaches can often have conflicting demands placed upon them and different experiences can cause their motivation to increase or decrease.

40) Using the timeline above as a guide, could you talk me through any changes in how motivated you were **to participate on the programme**?

Probe: e.g, how, if at all did your motivation to teach your athletes psychological skills change after the information session?

41) Using the timeline above as a guide, could you talk me through any changes in how motivated **you were to teach psychological skills to your athletes** throughout the programme?

42) Tell me about your current level of motivation to teach your athletes psychological skills?

43) In general how do you think the programme could be improved in order to increase or maintain coach motivation levels to teach psychological skills to their athletes? We are also interested the **reasons** for learning about psychological skills. Some coaches are self-motivated and others are motivated due to other people or external pressures.

44) What were your reasons for **continuing to participate in programme (and completing it)**?

OUTCOMES SECTION

Think back to your coaching, before you started the programme with Rosie

COACHING OUTCOMES

45) Describe to me, how you feel about your current level of understanding about the psychological skills which Rosie gave you information about?

46) What if anything would have improved your understanding of*psychological skills mentioned above*.....during the programme?

Think back to particular times (s) if any, following your work with Rosie, in which you have encouraged your athletes to use psychological skills.

47) At what stage in the programme, if at all, did you begin changing your coaching regarding psychological skills?

48) Which psychological skills if any, have you introduced to your coaching since doing the programme?

IF NO TEACHING OF PSYCHOLOGICAL SKILLS GO TO BOOKLET

55) Could you give me any examples of what you have done in terms of teaching*psychological skill(s) mentioned in previous question*.....and how have you done it?

PROBE: when exactly did this take place?

56) Generally, how, if at all, has the teaching of psychological skills been integrated into your coaching sessions?

PROBE: How often to you speak about psychological skills whilst coaching?

PROBE: Could you give any examples of coaching sessions like this?

57) If you tried teaching more than one psychological skill, were there any psychological skills that you found easier to teach than others?

Probe: What factors influenced these differences?

58) What, if anything did you find difficult about trying to teach psychological skills to your athletes?

59) What if any barriers, have prevented you from teaching your athletes psychological skills following your work with Rosie?

Thank you. That was very useful to gain your perspective as a coach

Now let's talk about your athletes.....

ATHLETE OUTCOMES

60) In general, how did your athletes respond to any changes in your coaching regarding psychological skills?

Probe: Can you describe in more detail which changes caused those responses?

61) Which athletes do you think **tried to use psychological skills after** you taught them about*psychological skills mentioned above*.....?

Probe: **Why** do think this was the case?

62) Which athletes did **not respond** to being taught about..... *psychological skills mentioned above*...

Probe: **Why** do you think this was the case?

63) Can you describe your athletes' current level of understanding about psychological skills?

Probe: How much do they know about psychological skills

64) Specifically, which, if any, psychological skills do you think your athletes currently use?

For example imagery, goal setting, self-talk, relaxation, pre-performance routines

65) As athletes their psychological skill use can change for lots of different reasons.

To what extent, if at all, do you think your athletes' use of..... *psychological skills previously mentioned*..... has been influenced by the work you did during the programme?

Probe: What other factors do you think have influenced the extent to which your athletes use psychological skills?

66) Following the programme, what changes have taken place, if any, with regards to your athletes' attitudes towards training?

Can you give me some examples of these changes?

IF ANY CHANGES ASK PROBES

Probe To what extent do you think these changes in your athlete' attitudes towards training, were caused by the programme?

Probe: What other factors do you think might have influenced the extent to which your athletes use psychological skills?

Ok, so returning to talking a bit more about you.....

67) If I followed you through a coach session before the programme had started and today what, if anything else, would I see you doing which has been influenced by the programme?

Probe: What activities might you do during a typical coaching session?

68) Following the programme, have any other changes have taken place for your and/or your athletes, which might have been caused by the programme?

69) Currently, to what extent do you wish to continue learning about psychological skills as a coach?

- 70) What are the reasons why you *do/do not* wish to continue learning about psychological skills?
- 71) Currently, to what extent do you wish to continue teaching your athletes about psychological skills?
- 72) What are the reasons why you *do or do not* wish to continue teaching your athletes about psychological skills?
- 73) Before we go on to the last set of questions, think back to when I asked you, what, if anything did you have for being involved in the programme? You said.....*see notes for question 4*.....
- To what extent were these goals achieved?
-

COACH STRENGTHS & WEAKNESSES

Coach perceptions of program strengths, weaknesses and potential improvements

- 74) Let me turn to your personal opinion of the whole program (in general)

What are some of the strengths of the programme?

- 75) What are some of the weaknesses of the programme?

When comparing this programme to other coach education in sport psychology you have received (if no other sports psychology education, compare to general coach education)

- 76) Was there anything better about this programme than other coach education you have received?
- 77) Was there anything worse about this programme than other coach education you have received?
- 78) Ok, you have given a lot of information about your experiences in the program and its strengths and weaknesses. Now I'd like to ask you about your recommendations for the program. If you could change anything about the coach education programme what would change?
- 79) Were there any barriers you had to overcome in order to fully participate in the program?
- 80) Are there any barriers which might stop **other coaches** from participating in the future?
-

You have given lots of detail about your involvement in the programme; now let's talk about the psychologist who conducted the programme.....Tell me about working with Rosie

Structure

- 81) How clearly was each stage of the programme explained to you?

ASK Probe: can you give any examples of this?

Structure

- 82) To what extent, did Rosie provide you with useful feedback regarding your teaching of psychological skills?

ASK Probe: can you explain in more detail when she did this?

Structure/Autonomy (rationale)

83) To what extent did Rosie provide clear explanations of psychological skill information and activities?

ASK Probe: can you give any examples of this?

Structure/Autonomy (rationale)

84) To what extent did Rosie assist you to set specific goals for your teaching of psychological skills throughout the programme?

ASK Probe: can you explain in more detail when she did this

Structure/Autonomy (rationale)

85) To what extent did Rosie provide clear explanations regarding psychological skills?

Probe: can you give any examples of this?

Autonomy

86) How much choice did Rosie give you regarding the activities and content of the programme?

Probe: can you give any examples of this?

Interpersonal Involvement

87) How, if at all did Rosie seem interested in your coaching?

Probe: can you give any examples of this?

Needs Satisfaction of coaches

Competence

88) How did you feel about your abilities as a coach during the programme?

Probe: To what extent did you feel good at coaching during the programme?

Autonomy

89) How much control did you have over the psychological skill activities you carried out during the programme?

90) Did you ever feel pressured into doing anything during the programme?

Relatedness

91) To what extent, you could talk to others (psychologists, coaches) about psychological skills during the programme?

Probe: How much support from others did you experience during the programme?

Athlete Interview

Today I would like to ask you about your experience as an athlete and what it's like to work with your coach, particularly when talking about the mental side of your performance.

Some of the questions I will be asking will ask you to compare between two different time points 1 and time 2 on this timeline (*shows time line to athlete*). This is because your coach has participated in the education programme over this time and we are interested in changes which resulted from the programme. To help you remember, if you haven't done so already, please think back to these times and make a note of any important competitions or events which happened during these times.

Warm up questions

So one of the sports you are involved in with.....*name of coach*.....is.....
Sport.....is that right?

1) How long have you been involved in.....*sport*.....for?

Athletes Psychological Skills

Think about the different qualities which are important to perform your sport well

2) What do you think are important Mental (or psychological) qualities to have to be a good ... *type of athlete*?

Interviewer notes down

3) If you hear the word psychological or mental skills, related to*sport*..... what do you think of?

Probe: what do you think mental skills are?

That's interesting, as they mean different things to different people

Today, when we are talking about mental strategies which you can use whilst doing your sport, they might be things like talking to yourself positively, imaging your performance, breathing or relaxation exercises, setting yourself goals, and being able to control your emotions and thoughts.

Some direct examples might be;

- Deliberately saying something to yourself like 'keep low' could be a mental skill.
- Deliberately, imagining yourself *skating* well before you get onto the *ice* could be a mental skill.
- Deciding exactly what you want to achieve in your skating and how you will go about achieving it, is known as goal setting.
- Taking time and steadying your breathing before the start of a routine could be a form of relaxation.

Mental skills are activities or methods which can be used to develop some of the mental qualities such

as.....*interviewer lists some of words mentioned by athletes in question 3*.....

MENTAL SKILLS IN TRAINING

Some athletes use mental skills deliberately as part of their training, others do not use mental skills, others are not aware of how they might be using mental skills, so using mental skills, is not a sign of your sporting ability.

4) Which mental skills if any, do you think you use whilst training?

Mental skills might include talking to yourself positively, imaging your performance, breathing or relaxation exercises, setting yourself goals, controlling your emotions and thoughts.

IF NOT DETAILED ANSWER USE THE PROBES

Probe: Do you use any mental activities which help you to prepare for training mentally?

Probe: Do you do any mental activities to help you persist or perform well during training?

Probe: What do you do to improve your mental state after training?

5) Do you ever use*imagery*for training purposes?....tell more about that.

ASK Q6- Q11 ONLY IF THE ATHLETE USES MENTAL SKILLS;

6) Can you describe some **examples** of the types situations in which you use mental skills in your training environment(s)?

Probe: Mental skills might include talking to yourself positively, imaging your performance, breathing or relaxation exercises, setting yourself goals, controlling your emotions and thoughts.

Probe: How do you prepare mentally for training

Probe: How do you manage your mental state whilst training

Probe: What might you do following a training session to mentally re-adjust?

7) Can you describe some examples of the types of situations if any, in which you use *imagery* in training.

8) Tell me more about the **process of how** you use.... *imagery* ...in training.

9) In general, how **often** if at all, do you do this type of mental activity (e.,g imagery) in your training environment?

Again looking at the timeline back to time 1 and time 2 (*show time line to athlete*) and remembering your training sessions during these times.

10) How if at all, do you think your mental skill use in your training changed between time 1 and time 2?

11) Specifically, how if at all did your use of ...*imagery*....in training change between time 1 and time 2?

ASK ALL ATHLETES THE NEXT QUESTIONS

Now thinking about the coaching you receive in the context of mental skills

12) What, if anything, does your coach say to you about using mental skills in **training**?

Probe: Does your coach ever talk to you about; talking to yourself positively, imaging your performance, breathing or relaxation exercises, setting yourself goals, controlling your emotions and thoughts.

13) Tell me more about what your coach says to you, if anything about using ...*imagery* ... in training?

That's really interesting, as most coaches do and say different things to their athletes

IF NO ENCOURAGEMENT GO TO QUESTION20

14) Can you describe some of **the situations when** your coach, **Marika** talks to you about.....*repeat the mental skills that athlete has suggested*.....for training?

15) Can you describe **some of situations when**, if any, when your coach might talk to you about using.....*imagery* in training?

16) Can you give any **examples of how** your coach includes....*imagery*....in your training.

17) What changes if any, have you made regarding your ice skating training based on your coach talking about things like..... *imagery* .

18) Looking at the timeline again, think back to time 1 and time 2 and try to remember the coaching you received and your training during these times. Comparing time 1 and time 2, what differences if any, do you think there were, in terms of your coach encouraging you to use.....*imagery*..... in training?

ASK ALL ATHLETES NEXT QUESTIONS

19) Comparing time 1 and time 2, what (other) differences, if any, do you think there were, in terms of the coaching you've had in training?

20) So what do you think influences your current use of *imagery and mental skills mentioned by the athlete.....*for your *...ice skating ...training*?

MENTAL SKILLS IN COMPETITION

Now I want to ask you similar questions as before but now I want to know about your mental skill use when you compete (or play games or matches)

21) Which mental skills if any, do you think you use whilst competing?
If not very detailed USE PROBES:

Probe: Do you use any mental activities which help you prepare for competition?

Probe: What do you do to help you persist or perform well during training?

Probe: What do you do to improve your mental state after competition?

22) Do you ever use *...imagery.....* *...in preparation or during competitions?* Tell me more about that

ONLY ASK 23-28 IF THE ATHLETE USES MENTAL SKILLS;

23) Can you describe some **examples** of the types **situations when** you use mental skills in a competition environment?

Probe: Mental skills might include talking to yourself positively, imaging your performance, breathing or relaxation exercises, setting yourself goals, controlling your emotions and thoughts.

Probe: What do you do to prepare mentally for competition

Probe: How do you manage your mental state whilst competing

Probe: What might you do following a competition to mentally re-adjust?

24) Can you describe some examples, if any, of the types of **situations when** you use **Imagery** in competition?

25) Tell me more about **the process of how** you use **imagery** in competition.

26) In general, how **often** if at all, you do this type of mental activity (e.g., imagery) in your competition environment?

Again looking at the timeline **back to time 1 and time 2** (*show time line to athlete*) and remembering your competitions during these two times.

27) How if at all, do you think your mental skill use in competition changed between time 1 and time 2?

28) Specifically, how if at all did your use of.....**imagery** *...in competition.* change between time 1 and time 2?

ASK ALL ATHLETES THE NEXT QUESTIONS

Now thinking about the coaching you receive and your mental skills

29) What, if anything, does your coach say to you about using mental skills in **competition**?

Probe: Does your coach ever talk to you about; talking to yourself positively, imaging your performance, breathing or relaxation exercises, setting yourself goals, controlling your emotions and thoughts.

30) Tell me more about what your coach says to you, if anything about using *...imagery ...in competition.* That's really interesting, as most coaches do and say different things to their athletes.

IF NO ENCOURAGEMENT GO TO QUESTION39.

31) Can you describe to me **the situations when** your coach, *Marika* talks to you about using.....*repeat the answer that athlete has given.....*for and in competitions?

32) Can you describe to me **the situations when**, your coach, *Marika*, talks to you about using *...imagery*for and in competitions?

33) Can you give any **examples of how** your coach includes imagery when preparing you for competitions (both away and at competition venue).

34) What changes if any, have you made regarding your **ice skating** in competition based on your coach talking about things like.....**imagery**. .

- 35) Looking at the timeline again, think back to time 1 and time 2 and try to remember the coaching you received and your competitions during these times. Comparing time 1 and time 2, what differences if any, do you think there were, in terms of your coach encouraging you to use.....**imagery** in competition?
- 36) Comparing time 1 and time 2, what other differences, if any do you think there were, in terms of the coaching you've had for and in competitions?
- 37) What changes if any, have you made regarding your competition preparation and performance based on your coach talking about things like.....*mental skills mentioned by the athlete*.
- 38) Again, looking at the timeline, think back to time 1 and time 2 and try to remember your coaching and competitions at during these two times. Comparing time 1 and time 2, what differences, if any, do you think there were, in terms of your coach encouraging you to use psychological skills in competition?
ASK ALL ATHLETES THE NEXT QUESTIONS
- 39) Comparing time 1 and time 2, what (other) differences, if any, do you think there were, in terms of the coaching you've had for and in competitions?
- 40) So what do you think influences your current use of *imagery and mental skills mentioned by the athlete*.....for your sport during competitions?

IF NO COACH ENCOURAGEMENT RECEIVED GO TO QUESTION 49

Back to more recent coaching you have received in last month

- 41) How, if at all has your coach supported you to develop your use of.. *mental skills coach focused on*...in the past month?
- 42) Think back to the last time your coach has talked to you about.....*mental skills coach focused on*.. how clear were your coaches' explanations of ...*mental skills coach focused on*?
- 43) How clear are your coaches' explanations of how to use*mental skills coach focused on*?
Probe: can you give examples of this?
- 44) What options if any, did your coach give you about using mental skills *mental skills that were encouraged*?
Probe: can you give examples of this?
- 45) How motivated currently to further enhance your use of mental skills?
Probe: What are the reasons that motivate you?

Thank you, your answers are really helpful.

Now I'd like to ask you about your preferences and recommendations for your coach,

When your coach speaks to you about mental skills and preparation;

- 46) What, if any are some of the things you like about the way your coach encourages you to use.....**imagery and mental skills previously mentioned**?
- 47) What, if any are some of things you would like to change about the way your coach encourages you to use..... **Imagery and mental skills previously mentioned**?

Probe: Tell me about how your coach might improve the way they encourage you to use.....**Imagery and mental skills previously mentioned**?

BEGIN HERE IF NO ENCOURAGEMENT OF MENTAL SKILLS

- 48) In general, how would you describe your relationship with your coach,*coach name*....?
Probe: How close is your relationship with your coach?

- 48) In which situations if any, would you like your coach to talk about mental skills to you more often?
And now talking about other athletes;
- 50) Have you ever spoken to other athletes about using mental skills?

Athletes training behaviours

That's interesting. Now we are interested in the way you train and how it has changed .

Although the amount of effort you put into training can remain the same over long periods of time, athletes effort into training can go up and down for lots of different reasons during their sporting lives.

- 51) How, if at all, did the effort you put into training sessions today compared to nine months ago change between time 1 and time 2?
- 52) How, if at all, if at all did the effort you put into to extra workouts etc away from formal sessions with your coach change between time 1 and time 2?
- 53) How, if at all, did your behaviour changed in terms of how professional you are (i.e., turning up on time, with the correct kit etc) change between time 1 and time 2?
- 54) How, if at all did your respect for coaches and players change between time 1 and time 2?
- 55) How if at all did your motivation to train and compete change between time 1 and time 2?
- 56) How, if at all did your ability to cope with set-backs in your sport change between time 1 and time 2?
Probe: coping with failure, means when move on after you make mistakes or pick yourself up when you're down.
- 57) How, if at all did asking for feedback regarding your own performance change between time 1 and time 2 (e.g., ask questions to your coach, self-evaluating)?

All athletes

You filled out some questionnaires about your training, mental skill use and the extent to which your coach encourages you to use mental skills at two different times. What do you remember about the experience of completing these questionnaires?

- 58) When you first filled out the questionnaires, how easy did you find the questions to understand?
- 59) Before filling in the questionnaires how aware were you of your own mental skill use?
- 60) How had your awareness altered if at all, when filling out the questionnaires for the second time?
- 61) What made it difficult for you/prevented you from completing the questionnaires?
- 62) Was there anything which could be improved to make the questionnaires easier to fill in?

Appendix E

The questionnaire items used to measure the nature of coach motivation were adapted from the Learning Self-Regulation Questionnaire (LSRQ: Williams & Deci, 1996; Ryan & Connell, 1989). The items represent both controlled (i.e., external and introjected) and autonomous (i.e., integrated) reasons for why students participated on a course. Scores were calculated for each of the two subscales by summing the items on the subscale, and a total score, the RAI, can be calculated by subtracting the Controlled subscale score from the Autonomy subscale score.

Coach name:

The following questions relate to **your reasons** for participating in this coach education programme on mental skills '**coaching minds**'. Different people have different reasons for their participation in such activities, and we want to know how true each of the reasons is for you. Please use the following scale to indicate how true each reason is for you.

Please note. Mental skills are strategies or activities which athletes use to improve their mental state, well-being and therefore their performance.

MENTAL SKILLS
Mental Strategies/practices
Effective goal setting
Use of imagery
Positive self-talk
Relaxation Strategies

Please give honest responses, your responses will remain anonymous and confidential from all programme deliverers, your responses will only be accessed by Dr Ross Roberts, Bangor University.

A. I will participate in this coach education programme:

1. Because I feel like it's a good way to improve my skills and my understanding of athletes.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

2. Because others would think badly of me if I didn't.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

3. Because learning is an important part of being a coach.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

4. Because I would feel bad about myself if I didn't learn more about mental skills.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

B. I am likely to follow suggestions I receive from coach education instructors on this programme:

5. Because I would get positive feedback from my manager if I do what the instructor suggests.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

6. Because I believe my instructor's suggestions will help me coach effectively.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

7. Because I want others to think that I am a good coach.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

8. Because it's easier to do what I'm told than to think about it.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

9. Because it's important to me to do well at coaching mental skills.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

10. Because I would probably feel guilty if I didn't comply with the instructor's suggestions.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

C. The reason that I will continue to broaden my skills regarding sport psychology is:

11. Because it's exciting to try new ways to work with my athletes.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

12. Because I would feel proud if I continued to improve at coaching mental skills.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

13. Because it's a challenge to really understand what an athlete's mindset is.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

14. Because it's interesting to try to use mental skills to assist athletes.

1	2	3	4	5	6	7
Not true			Somewhat			Very
At all			true			true

Appendix F

PLEASE READ THESE INSTRUCTIONS BEFORE COMPLETING THE QUESTIONNAIRE

This questionnaire measures performance strategies which your coach encourages you to use in various sport situations.

Because individual athletes and coaches are very different in their approach to their sport, we expect the responses to be different.

We want to stress, therefore, that **there are no right or wrong answers**. All that is required is for you to be open and honest in your responses.

Throughout the questionnaire, several terms are used which may have different meanings for different individuals. Because of this, these terms are defined below with specific examples to sport where appropriate.

Please keep these definitions in mind when responding to items with these terms.

A SPECIFIC GOAL: is a clear aim or objective towards which effort is directed

GOAL SETTING: are methods of deciding exactly what you want to achieve in your sport and how you will go about achieving it.

E.g., deciding as a team that next year you want to win the league would be setting an outcome goal.

E.g., writing down what exercises you want to complete in the next training session is a method for setting performance goals.

E.g., recording how you would like to execute a skill in competition is a method for setting process goal.

The Coaching Goal Setting Scale

Each of the following items describes a specific situation you may encounter when you spend time with your coach you named on the first page

(Add name).....

Please rate how frequently these situations occur on the following scale

0 = Never

1 = Rarely

2 = Sometimes

3 = Often

4 = Always

Please circle around your answer

		Never	Rarely	Sometimes	Often	Always
1.	My coach watches out for my use of goal setting during my sport.	0	1	2	3	4
2.	My coach includes specific goals in his/her instructions.	0	1	2	3	4

		Never	Rarely	Sometimes	Often	Always
3.	My coach talks about specific goals to help me be in the right mental state.	0	1	2	3	4
4.	My coach asks me to use goal setting .	0	1	2	3	4
5.	My coach picks up on my use of goal setting .	0	1	2	3	4
6.	My coach reminds me to use goal setting .	0	1	2	3	4
7.	My coach describes specific goals to make things easier to understand.	0	1	2	3	4
8.	My coach notices how much I use goal setting .	0	1	2	3	4
9.	My coach tests my use of goal setting .	0	1	2	3	4
10.	My coach tells me technical information by talking about specific goals .	0	1	2	3	4
11.	My coach encourages me to use goal setting .	0	1	2	3	4
12.	My coach instructs me to use goal setting .	0	1	2	3	4
13.	My coach reinforces my use of goal setting .	0	1	2	3	4

Goal Setting Support Scale

Please rate how frequently these situations occur on the following scale

0 = Not at all true of me

1

2

3

4= Very true of me

Not at all true of me

Very true of me

Please circle around your answer

1.	My coach encourages me to take my own initiative about using goal setting .	0	1	2	3	4
2.	My coach makes it clear what to expect from using goal setting .	0	1	2	3	4
3.	My coach provides me with positive feedback about my use of goal setting .	0	1	2	3	4
4.	My coach gives me good advice about goal setting .	0	1	2	3	4
5.	My coach explains why using goal setting could help my performance.	0	1	2	3	4
6.	My coach encourages me to reflect on my use of goal setting .	0	1	2	3	4
7.	My coach takes into account my needs when speaking with me about goal setting .	0	1	2	3	4
8.	My coach makes it clear what I need to do to get positive effects from using goal setting .	0	1	2	3	4

Appendix G

Mental Strategy Inventory (MAI)

Please put a line through to mark how true or false the following statements are when referring to your experience of using mental skills or strategies in sports performance.

There are NO right or wrong answers, please be honest, using mental skills does not say anything about your ability as an athlete or the standard of coaching you receive. All responses will remain confidential.

Mental skills are strategies or activities which athletes use to improve their mental state, well-being and therefore their performance. **Using mental skills could include;** visualisation, talking yourself positively, having a certain routine before you perform, setting goals regularly, being able to relax or energise yourself quickly.

e.g.,

. I try to use mental strategies that have worked in the past during sport.

True	<input checked="" type="checkbox"/>	False
------	-------------------------------------	-------

1. I try to use mental strategies that have worked in the past during sport. (PK)

True	<input type="checkbox"/>	False
------	--------------------------	-------

2. I know what kind of mental skills are the most important for me to learn. (DK)

True	<input type="checkbox"/>	False
------	--------------------------	-------

3. I am good at organizing information regarding mental skills. (DK)

True	<input type="checkbox"/>	False
------	--------------------------	-------

4. I have a specific purpose for each mental strategy I use. (PK)

True	<input type="checkbox"/>	False
------	--------------------------	-------

5. I am good at remembering information about mental strategies. (DK)

True	<input type="checkbox"/>	False
------	--------------------------	-------

6. I use different mental strategies depending on the situation in sport. (CK)

True	<input type="checkbox"/>	False
------	--------------------------	-------

7. I can motivate myself by using mental skills when I need to. (CK)

True	<input type="checkbox"/>	False
------	--------------------------	-------

8. I am aware of what mental strategies I use when I play sport.(PK)

True	False
------	-------

9. I use my mental strengths to compensate for my weaknesses in sport.(CK)

True	False
------	-------

10. I am a good judge of how well I understand something about mental skills. (DK)

True	False
------	-------

11. I find myself using helpful mental strategies automatically when I do my sport. (PK)

True	False
------	-------

12. I know when each mental strategy I use will be most effective. (CK)

True	False
------	-------

CK= Conditional knowledge

DK= Declarative knowledge

PK= Procedural knowledge

APPENDIX H

Hi it's Rosie from Bangor University, how are you?

As we have discussed I would like to ask you some questions, following your viewing of the introduction session (needs analysis). Have you managed to watch this information session?

First of all I would to ask you some questions to establish the psychological skill you have chosen to focus on and your understanding of that skill at the moment.

We are asking these questions to get a general impression of where coaches' are at with their understanding before the programme.

(mentoring) This will help us to make the programme as effective and useful as possible for you.

(online). Answering these questions will help you to reflect on where your knowledge is and how you could use the programme to fill in some gaps.

It does not matter how detailed your responses are or whether you are unsure of what to say. This is not a test or an indication of your ability as a coach.

Some coaches give very detailed answers and so will use to programme differently, some coaches give quite short answers and some do not answer at all. Regardless of what type of answer you give, this programme is designed to assist you, and not test you.

We are simply trying to obtain information about the coaches on our programme. Answering these questions should take about 30 minutes and I would like to record your responses. All your responses will remain confidential within the Bangor University research team, your name and sport will remain anonymous in any subsequent publications. Are you happy to answer these questions now?

Following these questions I would like to confirm arrangements for questionnaire completion by your athlete within the next few weeks.

First of all which psychological skill have you chosen to focus on during the rest of the programme?

.....

Please choose one of the following answers from the options I will read out;

1. Psychological skills.....

- a) Are mental qualities such as confidence, motivation and awareness
- b) Are mental strategies which can used by athletes to enhance their well-being and performance
- c) Is the ability to perform well under pressure
- d) I don't know exactly what psychological skills are

2. Psychological skills.....

- a) Are unchangeable psychological characteristics of an athlete.
- b) Can be learnt by athletes and developed upon.
- c) Change solely based on the environment an athlete is in.
- d) I don't know if athlete's psychological skill use can be altered or not.

Appendix I

In the following questionnaire, you will be asked to list the attributes of the type of coach you think you actually, ideally, and ought to be.

Ideal self: Your beliefs concerning the attributes you would like ideally to possess; your ultimate goals for yourself.

All your responses will remain confidential.

1. List 5 phrases that describe the nature of how ideally you would like your coaching to be, your ultimate goals for your coaching. 2. Now circle How much your coaching is like this on the 1-4 scale.	Not at all			Very much
E.g., Creating a fun environment	1	2	3	4
1.	1	2	3	4
2.	1	2	3	4
3.	1	2	3	4
4.	1	2	3	4
5.	1	2	3	4

Appendix J

Situational Procedural Knowledge Interview

The following question is NOT A TEST, please don't worry if you find this question difficult it is simply to gain information before you complete the programme. We are asking this questions to get a general impression of where coaches' are at with their understanding before/after the programme to help us to make the programme as effective in the future.

It does not matter how detailed your responses are or whether you are unsure of what to say. This is not a test or an indication of your ability as a coach. Some coaches give very detailed answers, some coaches give quite short answers and some do not answer at all.

Regardless of what type of answer you give, this programme is designed to assist you, and not to test you.

Having this information will help us to make this and future programmes as effective and useful as possible for you.

1.) In the situation I will describe please suggest how you could effectively assist

You are giving advice to another coach, who would like his/her athletes to improve their performance by using **goal setting** more effectively, what information about coaching goal setting effectively might you give him/her?

*Include any important considerations/information and useful ways of developing use of **goal setting** in the athletes*

Category	Grade	Description	Category
1. Declarative knowledge (what the PS is)	2.5	Thorough, detailed and accurate understanding of the nature of specific PS, evidence of psychological theory of why it helps athletes and extensive understanding regarding the skill, with no errors.	Outstanding/excellent
	2	Accurate understanding of the nature of the PS, with some in depth detail provided about what and why PS help athletes with few irrelevances.	Good
	1.5	Most but not all information about PS were described with clarity. Most key were points covered. However information was mostly basic and/or there were some omissions, errors or irrelevant comments. Some prompting needed.	Reasonable/fair
	1	Some knowledge about the PS was conveyed, however knowledge was somewhat inaccurate with a lack of clarity, errors and irrelevancies. Most comments were not made relevant to PS and did not cover key points about the PS.	Poor
	.5	Very little or no understanding of the skill.	Very weak/no knowledge

2. Procedural knowledge (how to coach PS)	5	Evidence of an extensive depth and breadth of accurate knowledge about the realistic necessary steps required to coach the PS, including targeted cueing and provision of need supportive coaching PS (providing explanations and seeking athlete involvement), how to educate the athletes regarding PS in an inspiring way, increase their awareness of PS, help them develop specific strategies and track the use of these strategies. In depth insights and multiple specific exercises which could assist other coaches.	Outstanding/ excellent
	4	Accurate knowledge with some in depth detail about the realistic necessary steps to coach the PS, including targeted cueing and provision of need supportive coaching PS (providing explanations and seeking athlete involvement). Some but not all of the following covered: how to educate the athletes regarding PS, increase their awareness of PS, help them develop specific strategies and track the use of these strategies and specific exercises mentioned. Few irrelevancies or errors.	Good
	3	Reasonable grasp of the realistic necessary steps to coach the PS including targeted cueing and teaching strategies to athletes and mostly basic knowledge about how to educate the athletes, regarding PS some specific approaches mentioned but mostly general comments. Evidence of some omissions, errors and/or irrelevant comments. Some prompting needed.	Reasonable/fair
	2	Some knowledge about how to coach PS was conveyed, however knowledge was somewhat inaccurate with a lack of clarity, errors and irrelevancies. Did not cover key points about how to coach PS.	Poor
	1	Very little or no understanding of how to coach the skill.	Very weak/no knowledge
3. breath and depth strategic knowledge (when to coach PS, with who and why coaching in that way).	5	Evidence of an extensive depth and breadth of accurate knowledge about when in the season to coach PS and why and how different approaches could be used with different athletes. Illustrating breath of knowledge of coaching PS in a variety of contexts (training, competition, different standard athletes) to address a variety of performance improvements or issues. In depth insights and specific detail which could assist other coaches.	Outstanding/ excellent
	4	Accurate knowledge in some detail about when in the season to coach PS and how different approaches could be used with different athletes. Some specific knowledge of coaching PS contexts (training, competition, different standard athletes) to address different of performance improvements or issues. Few irrelevancies or errors.	Good
	3	Reasonable grasp of when to coach PS and basic knowledge about different approaches could be used with different athletes but mostly general comments. Evidence of some omissions, errors and/or irrelevant comments. Some prompting needed.	Reasonable/fair
	2	Some knowledge about when and with who to coach PS was conveyed, however knowledge was somewhat inaccurate with a lack of clarity, errors and irrelevancies. Did not cover key points about how to coach PS.	Poor
	1	Very little or no understanding of when and with whom coaching PS is appropriate .	Very weak/no knowledge

Appendix K

Coach Post-Test Interview Guide Study 4

Please be honest when I ask the next few questions regarding your experiences on the programme, as this will help us to know how to improve this type of programme or what were the positive things which need to be continued.

1) What (if any) impact has this programme had?

Prompt: any impact on your coaching?

Prompt: If I watched you coaching now and I had watched you before the intervention, what if any differences might I see?

Prompt: impact on your athletes

2) What (if any) barriers did you experience to you coaching psychological skills covered on the programme?

Prompt: what if anything got in the way of coaching PS?

Prompt: what if anything made difficult to coach PS?

3) What (if any) strengths did this programme have?

Prompt: what if anything about the programme helped you to coach PS?

4) How do your experiences on this programme compare to other coach education programme you have been on?

5) How (if at all) could this programme be improved?

Prompt: In an ideal world, what would you change about this programme to make it more helpful?

6) Do you have any other comments about the programme and your experiences?

APPENDIX L

Publication Plan

It has been proposed to publish the presented PhD as two multi-study papers.

Publication one: *The conceptualisation and measurement of the coaching of PS*

Publication One will include:

Study 2 (Coach and athlete interviews from Chapter 1 analysed using Hierarchical content analysis)

Study 3 (Questionnaire Development and Psychometric questionnaire validation; Discriminant Validity)

Study 4 (Questionnaires Concurrent Validity and Predictive Validity)

Publication two: *Complex interventions in sport psychology: Coach behaviour change and psychological skills*

Publication Two will include:

Study 1 (Developing a complex coach intervention: a need supportive psychological skills intervention)

Study 5 (The evaluation of a complex coach behaviour change intervention for the coaching of PS)

Presentation and explanation of the intervention model (See Figure 1)