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Advancing the understanding of self-talk: a self-determination theory perspective

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Bangor University

School of Sport, Health and Exercise Sciences



Advancing the understanding of self-talk: A self-determination theory perspective.

By

EMILY J. OLIVER

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A thesis submitted to the School of Sport, Health and

Exercise Sciences in fulfilment of the requirements

for the degree of Doctor of Philosophy.



Summary of Thesis:

Self-determination theory (SDT; Deci & Ryan, 1985, 2000) is an approach to understanding human motivation which holds that the satisfaction of certain innate psychological needs is the basis for self-motivation, psychological growth, and optimal well-being. Cognitive evaluation theory (CET: Deci & Ryan, 1985), a subtheory within SDT, provides further detail regarding how events relevant to the initiation and regulation of behaviour can impact upon psychological need satisfaction and subsequent well-being. Events are posited to have one of three aspects, informational, controlling, or amotivational. Drawing on this theoretical framework, the present thesis adopts the position that self-talk represents an internal regulatory event that can be experienced as informational or controlling, with subsequent differential consequences for behavioural and affective outcomes.

Consisting of a general introduction, five empirical chapters, and a general discussion, this thesis had three main aims. First, to extend self-talk research by examining its antecedents and effects in the context of a contemporary motivational theory. Second, to test an SDT-based model in which self-talk is a component of athletes' experience of the motivational environment in sport. The final aim of this thesis was to develop an understanding of athletes' behaviour in the training environment and the impact of self-talk on psychological need satisfaction and training behaviours. In order to achieve these aims, the effects of autonomy-supportive versus controlling environments on individuals' self-talk were examined, measures of informational and controlling self-talk and athlete training behaviours were developed, the relationships between the two types of self-talk and affect were explored, and the relationships between psychological need support, self-talk, need

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satisfaction and behavioural outcomes were investigated in a high performance sports setting.

Taken together, this main findings of this series of five studies were as follows: (1) evidence was provided that self-talk can be meaningfully differentiated into informational and controlling components; (2) the degree to which the environment supports basic needs is related to the content and functional significance of self-talk; (3) the functional significance of self-talk is associated with a number of affective and behavioural outcomes; specifically, informational self-talk is associated with more desirable outcomes; (4) athletes' need satisfaction is predictive of their training behaviours; and (5) that examining the antecedents and consequences of how one experiences one's self-talk (i.e., its functional significance) in the context of SDT appears promising.

This thesis has made contributions to motivation oriented research by providing further evidence to support the propositions of SDT regarding the benefits of need supportive environments for optimal motivational, affective, and behavioural outcomes. For the first time positive associations were identified between needs support, need satisfaction, and athletes' training behaviours. Furthermore, the crucial role of self-talk in the motivational experience was highlighted. Findings regarding the functional significance of self-talk have important theoretical and applied implications, not least highlighting the role of how individuals experience their selftalk in determining affective and behavioural response to the social environment. Further research which builds on this series of studies will lead to a greater understanding of how self-talk is related to motivational processes and human behaviour.

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CHAPTER 1

GENERAL INTRODUCTION.

The impact of psychological skills upon athletes' cognition, affect, and behaviour comprises a central component of sport psychology research and practice. More specifically, self-talk is one such psychological skill commonly cited in the context of performance enhancement (e.g., Burton & Raedeke, 2008). For example, the widely used Test of Performance Strategies (TOPS; Thomas, Hardy, & Murphy, 1999; Hardy, Roberts, Thomas, & Murphy, 2010), which measures psychological skills used by athletes, includes two self-talk related subscales, representing the management of positive self-talk and negative self-talk respectively. Furthermore, research has shown that athletes report using self-talk in both competition and training contexts (Hardy, Gammage, & Hall, 2001), that self-talk is promoted by coaches and trainers (Hardy & Hall, 2006), and that coaches, athletes, and psychologists report a belief in its efficacy (Zizzi, Blom, Watson, Downey, & Geer, 2009; Weinberg & Jackson, 1990). However, it is only recently that self-talk has become a focus of systematic empirical investigation, and this research base is subject to a number of criticisms.

One of these limitations is that there is a lack of clarity regarding the definition and conceptualisation of self-talk, accompanied by a plethora of paradigms evident in the literature. Historically, a number of terms have been used to refer to self-talk including inner speech, internal dialogue, private speech, verbal rehearsal, and egocentric speech (Depape, Hakim-Larson, Voelker, Page, & Jackson, 2006). Generally, prior investigations of self-talk have typically focused on either overt (e.g., private speech, verbal rehearsal) or covert (e.g., inner speech, internal dialogue) verbal expressions, whereas within sport self-talk has been broadly defined as a multidimensional phenomenon concerned with verbalizations addressed to oneself, either overtly or covertly (cf. Hardy, Hall, & Hardy, 2005). These broad

conceptualisations of self-talk have resulted in its study through a range of concurrent and retrospective methodologies, including observation of overt speech (e.g., Van Raalte, Brewer, Rivera, & Petitpas, 1996), think aloud studies and video-stimulated recall (e.g., Hars & Calmels, 2007), thought listing (Acevedo, Dzewaltowski, Gill, & Noble, 1992), qualitative interviews or naturalistic investigation (e.g., Gould, Dieffenbach, & Moffett, 2002; Kress & Statler, 2007), and questionnaires or inventories (e.g., Zourbanos, Hatzigeorgiadis, Chroni, Theodroakis, & Papaioannou, 2009). Reported difficulties in measuring and quantifying self-talk (e.g., Meichenbaum & Butler, 1979; Ericsson & Simon, 1993) may explain why several aspects of the nature and effects of self-talk have received limited research attention thus far, and why self-talk remains one of the least studied psychological skills promoted in applied sport psychology. Studying self-talk from a linguistic perspective presents additional issues, as it has been estimated that inner speech takes place approximately ten times faster than outer speech (Korba, 1990), with internal utterances condensed and abbreviated for efficiency (Wiley, 2006). Finally, there remains a general lack of theory-based research within the sport-focused literature (cf. Hardy, 2006).

Despite difficulties in its measurement and investigation, self-vocalisations have received research attention in a wide variety of domains. These include developmental and educational psychology (e.g., Fernyhough & Fradley, 2005; Burnett, 1999), counselling and clinical psychology (e.g., Nutt-Wiilliams & Hill, 1996), philosophy (e.g., Hurlbert & Schwitzgebel, 2007), neuropsychology (e.g., Girbau, 2007), criminology (e.g., Topalli, 2005), and linguistics (e.g., Carruthers & Boucher, 1998). Neuroimaging studies have begun to isolate regions of the cortex specialised in the production of covert as opposed to articulated speech (e.g., Shergill,

Tract, Seal, Rubia, & McGuire, 2006), suggesting innate or developed biological adaptations specifically for inner speech production. Furthermore, cortical regions specialised for language use regarding specific functions, such as goal-directed actions, have been identified (e.g., Iacoboni et al., 1999). Although researchers have concluded that all people seem to practice inner speech, there is still little known about it (Wiley, 2006). In summary, it appears that despite the broad interest in selftalk there is a dearth of theory-based research pertaining to its composition, antecedents, and effects. This is somewhat surprising given its potential theoretical applications.

The importance of studying self-directed verbal expressions is evident from psychological theory and research identifying conceptual links between cognitions, affect, and behaviour. Developmental theorists (e.g., Vygotsky, 1987) have argued that the evolution of our inner speech and linguistic capacity are intertwined with cognitive development. As such, self-directed cognitions have been utilised as a way of examining cognitive processes. The study of private speech in particular has provided insight into how humans process and manipulate information (e.g., Smith, 2007). Such research has identified links between self-speech and the execution of problem solving tasks, with improvements in performance shown when individuals use speech versus when they are told to use no private speech (Winsler, Manfra, & Diaz, 2007). These findings have been interpreted as support for the premise that self-talk predominantly serves a self-regulatory function (Fernyhough & Fradley, 2005).

Self-talk in clinical domains.

With regards to self-talk and affective states, it has been suggested that cognition and emotion are best conceptualised as interdependent, over-lapping

constructs (e.g., Meichenbaum & Butler, 1979). Given the pervasiveness of theoretical links between cognition and affect (e.g., Beck, 1976; Lazarus, 1991), it is perhaps surprising that only limited research has explicitly focused upon this relationship in a sporting context. However, there is a growing body of research with atypical populations which provides evidence pertaining to the role of self-directed cognitions in the manifestation, evolution, and symptomology of clinical conditions involving both affective and behavioural components. Ineffective, disrupted or maladaptive self-talk patterns have been identified in children with attention-deficit hyperactivity disorder (ADHD; Corkum, Humphries, Mullane, & Theriault, 2008), autistic and psychotic populations (e.g., Frawley, 2008), and individuals with anxiety disorders (e.g., Calvete & Cadeñoso, 2005). Furthermore, modification of individuals' cognitions, or the introduction of self-talk based interventions, has been shown to result in improvements in some clinical conditions. For example, in a study of depressed individuals, Kelly, Zuroff and Shapira (2009) found that a two-week programme of daily self-soothing or self-affirming self-talk resulted in decreased levels of depression and shame, and a concurrent reduction in somatic complaints. Likewise, Kendall and Treadwell (2007) reported that reductions in anxious self-talk mediated treatment gains for children with anxiety disorders undergoing a programme of cognitive behavioural therapy.

Additional evidence supporting a causal association between self-statements and affective states can be drawn from the coping literature. Research suggests that self-talk may be a potential strategy to cope with anxiety or negative affective states. For example, self-talk has been associated with enhanced coping in the contexts of living with chronic illness (Shawler & Logsdon, 2008; Burckhardt, Clark, & Bennett, 2005), in new mothers (O'Brien, Buikstra, Fallon, & Hegney, 2009), in women

coping with domestic abuse (Patzel, 2001), and with both acute (e.g., Barwood, Dalzell, Datta, Thelwell, & Tipton, 2006) and chronic pain (e.g., Ruehlman, Karoly, Newton, & Aiken, 2005). As such, monitoring and/or modification of self-talk forms a component of typical cognitive therapies used to assist coping with experienced or ongoing trauma (e.g., Kubany et al., 2004). In sport, self-talk has been reported to assist with coping with stress and anxiety by athletes (e.g., Nicholls, Holt, & Polman, 2007) and officials (e.g., Voight, 2009), and an experimental study has shown that self-verbalisations can buffer the effects of psychological crises on affective state and performance (Schüler & Langens, 2007).

Lastly, it has been argued that self-talk is a critical component of the initiation and regulation of behaviour (e.g., Brinthaupt, Hein, & Kramer, 2009). Models of hierarchical control (e.g., Norman & Shallice, 1986) posit that higher level processes such as cognitions, expectations, and goals impact directly upon our actions, and it has been argued that self-referent thought plays a paramount role in most contemporary theories of human behaviour (Bandura, 1997). Given the prevalence of cognitive theories of behaviour, self-talk is also increasingly being adopted as a variable of interest in studies examining behaviour change. For example, the clients' 'change talk', whether addressed to the self or the counsellor, is a key component of the behaviour change and resolution of ambiguity targeted through motivational interviewing (cf. Miller & Rose, 2009). To summarise, there are theoretical arguments identifying links between self-verbalisation and cognitive processes, affective states, and behavioural outcomes. Given its potential influences, it is not difficult to envisage how self-talk has become a topic of interest in the applied sciences.

Self-talk in sport and exercise psychology.

Within the domain of sport and exercise psychology, self-talk has been examined primarily as a strategy for performance enhancement. Early research tended to focus on the effects on performance of the valence of self-talk, that is whether it was positively or negatively phrased, with findings supporting the promotion and use of positive self-talk (e.g., Van Raalte et al., 1995; Dagrou & Gauvin, 1992). More recently, research investigating how and why athletes use selftalk has identified that athletes report using self-talk for a number of functions. For example, Hardy, Hall, and Hardy's (2005) Self-Talk Use Questionnaire (STUQ) assessed self-talk as being primarily employed for cognitive/instructional and motivational functions. More specifically, Hardy et al. suggested that athletes use instructional self-talk to assist their execution of individual skills, or to execute strategies, plays or routines. Additionally, the reported motivational functions of selftalk have included controlling arousal, maintaining focus, increasing self-confidence, mental preparation, coping in difficult situations, controlling effort, and reminding themselves of their goals. This study is consistent with other investigations examining the effects of self-talk designated as primarily instructional or motivational (e.g., Theodorakis, Weinberg, Natsis, Douma, & Kazakis, 2000), with findings indicating that self-talk content moderates its perceived function (e.g., Hatzigeorgiadis, Zourbanos, & Theodorakis, 2007). Recently, the Functions of Selftalk Ouestionnaire (FSTO; Theodorakis, Hatzigeorgiadis, & Chroni, 2008), was developed, based on research indicating that self-talk in sport can enhance attentional focus, increase confidence, regulate effort, control one's cognitive and emotional reactions, and trigger automatic execution of specific skills (Theodorakis et al., 2008).

Empirical findings have supported propositions that self-talk can be associated with a number of different outcomes. Research has shown that self-talk is positively associated with effort and persistence (Peters & Williams, 2006), attentional focus (e.g., Landin, 1994), and performance (e.g., Goudas, Hatzidimitriou, & Kikidi, 2006), and that self-talk is perceived by athletes to aid technique during skill execution (Chroni, Perkos, & Theodorakis, 2007), to assist with coping in challenging and difficult situations (Hardy, Gammage, & Hall, 2001), and to enhance concentration (e.g., Goudas et al., 2006). In addition to performance contexts, selftalk has been identified as a cognitive strategy which enhances motor skill acquisition in both typical (e.g., Cutton & Landin, 1999) and atypical (e.g., McEwan, Huijbregts, Ryan, & Polatajko, 2009) populations. For example, self-vocalisations have been shown to increase movement fluidity and velocity in simple reaching tasks for participants with strokes (Maitra, Telage, & Rice, 2006), and for individuals with Parkinson's disease (Maitra, 2007).

Self-talk and motivation.

Despite a growing body of self-talk oriented literature, theory-based research examining the antecedents and effects of self-talk in sport is in its infancy, with a number of recent calls for this to be addressed (e.g., Hardy, Oliver & Tod, 2008). One particular area that appears to be lacking the application of contemporary theory is the examination of the motivational effects of self-talk. It is possible that one explanation for this is that operational definitions of motivational self-talk in the literature are somewhat problematic. For example, motivational self-talk has been defined as statements that are "designed to help performance" (Tod, Thatcher, McGuigan, & Thatcher, 2009, p.196), via building confidence, enhancing effort, increasing energy expenditure and creating a positive mood (Theodorakis et al., 2000). These definitions focuses on the expected outcomes of motivational self-talk, notably excluding any direct effect on motivation per se. In fact, the primary purpose of motivational self-talk is aligned with enhancing performance. In addition, the phrase 'designed' would appear to apply to only purposeful self-talk, omitting any potential motivational effects of spontaneous self-statements. Furthermore, Theodorakis et al.'s (2000) proposition that positive self-talk can be equated with motivational self-talk blends the distinction between the content of self-talk and its predicted effects, and conflicts with previous theorizing and athlete reports that negative self-talk can be motivating (e.g., Goodhart, 1986; Hardy, Hall, & Alexander, 2001). This lack of clarity is extended to experimental studies, which frequently include a phrase (e.g., 'I can, I'm strong, Let's go, I've got it', Hatzigeorgiadis, Zourbanos, Goltsios, & Theodorakis, 2008; 'I can jump higher', Edwards, Tod, & McGuigan, 2008) that is assumed to be motivational on the basis of its content or athlete recommendations, without reference to theory to explain why such statements might be expected to enhance motivation.

Within sport psychology, researchers have applied several theories to the study of motivation, including achievement goal theory (e.g., Duda & Nicholls, 1992), Bandura's (1977, 1997) self-efficacy theory (e.g., Slanger & Rudestam, 1997), Deci and Ryan's (1985, 2000) self-determination theory (e.g., Vallerand & Losier, 1999), and theories of perceived control (see Biddle, 1999, for a review). It has been argued that such theories also have relevance to the study of the motivational effects of self-talk (Hardy, 2006; Hardy, Oliver & Tod, 2008). For example, self-efficacy theory posits that verbal persuasion is a precursor to the development of efficacy, and it is possible to conceptualise self-talk as a self-administered form of verbal encouragement. However, thus far self-determination theory (SDT) has not been

applied to the study of self-talk. This is unfortunate for two reasons. First, SDT (Deci & Ryan, 1985, 1991) is a contemporary theory of human motivation, which has been widely cited and investigated within the wider sport and exercise literature (e.g., see Hagger & Chatzisarantis, 2007). Second, and more importantly, SDT provides a framework for making explicit hypotheses about the effects of intrapersonal events, such as self-talk. The following section of this introduction presents an overview of SDT, focusing in particular on its relevance to the study of self-talk.

Self-determination theory.

SDT is an approach to understanding human motivation which holds that the satisfaction of certain innate psychological needs is the basis for self-motivation, psychological growth, and optimal well-being. Three innate psychological needs are hypothesised; autonomy, competence and relatedness. Autonomy is defined as a need for volition, for behaviour to be aligned with one's integrated sense of self combined with a perception that the self is the origin or driving force behind this behaviour (Deci & Ryan 2000; Reeve, Nix, & Hamm, 2003). Competence involves feeling one can deal effectively with one's environment and having the capacity to effect outcomes. Relatedness involves the need to experience closeness with others, and to have satisfying, mutually supportive social relationships. According to SDT, greatest well-being is experienced when these needs are satisfied, whereas thwarting of needs is likely to result in ill-health, negative psychological states, and poor well-being (Ryan & Deci, 2000).

A further central component of SDT is a consideration of the extent to which the regulation of a behaviour has become internalised and integrated into the person's sense of self so that they feel that they are self determined in their activities. In addition, SDT specifies social-contextual conditions that facilitate these processes

(Ryan & Deci, 2000). Specifically, the theory posits that social contexts that provide support for satisfaction of our innate psychological needs promote the natural processes of internalisation, integration of the self, and healthy psychological development. Conversely, social contexts which thwart basic need satisfaction are considered antagonistic to the internalisation and integration processes and psychological growth.

Cognitive evaluation theory (CET: Deci & Ryan, 1985), a sub-theory within SDT, provides further detail regarding how events relevant to the initiation and regulation of behaviour can impact upon psychological need satisfaction and subsequent well-being. Events are posited to have one of three aspects, informational, controlling, or amotivational. Informational events facilitate need satisfaction by providing effectance-relevant feedback and the experience of choice. Controlling events undermine need satisfaction by engendering pressures to act in particular ways. Finally, amotivational events facilitate perceptions of incompetence and promote amotivation, that is, a state in which people lack an intention to engage in behaviour. Importantly, CET makes no distinction between external social contextual events, such as the provision of feedback or rewards by others, and intrapersonal events such as self-monitoring, self-reinforcement, and self-control (Deci & Ryan, 1985). Instead, CET proposes a distinction between internally informational regulating episodes processed by the individual and experienced as free from pressures, and internally controlling regulation in which the individual pressurises themselves to act (Ryan, 1982). Deci and Ryan (1985) argue that to regulate oneself informationally is quite different from regulating oneself controllingly, and that controlling self-regulation is likely to have negative consequences for motivation and well-being.

Drawing on this theoretical framework, the present thesis adopts the position that self-talk represents an internal regulatory event that can be experienced as informational or controlling, with subsequent differential consequences for behavioural and affective outcomes. Importantly, the emphasis in CET is on the functional significance of events, that it, how one experiences or interprets specific events rather than their nature per se. In the context of self-talk, it is proposed that how one interprets or experiences self-talk is considered to be independent of its content. For example, the phrase "concentrate" may be experienced as pressurising and commanding, or as supportive and encouraging. This is aligned with contemporary literature which emphasises the need to consider the significance and meaning of inner speech to the individual. For example, Wiley (2006) argues that our self-speech is intra-subjective, as a result of obtaining its meaning from events peculiar to us, and therefore it is necessary to examine the interpretation and experience of such speech from the perspective of the individual.

Based on the predictions of SDT, the theoretical model in Figure 1 below was developed and systematically tested in this thesis. Providing a guiding framework for the series of studies, within the model the functional significance of self-talk is conceptualised as a consequence of the socio-environmental context with consequences for need satisfaction, motivation, and affective and behavioural outcomes. In line with CET, it was expected that informational self-talk would increase, and controlling self-talk would undermine, need satisfaction. In turn, need satisfaction was anticipated to predict a number of affective and behavioural outcomes. A summary of the aims of each study is presented next.



Figure 1. Proposed theoretical pathway model to be tested in current thesis. Note: Italics indicate variable not directly examined in current thesis.

Overview of studies.

First, Study 1 utilised an experimental design to examine the effect of autonomy supportive versus controlling conditions on individuals' self-talk during a novel task. There has been reasonably consistent support for the prediction of SDT that controlling contexts ought to undermine satisfaction of the need for autonomy, and thus result in impaired task motivation and well-being when compared to autonomy supportive contexts. However, little is known about how individuals cognitively process and respond to controlling or autonomy-supportive environments. Self-talk could therefore be conceptualised as a cognitive outcome of experiencing an autonomy-supportive versus a controlling environment. Furthermore, although social-contextual factors may directly affect the content or type of self-talk (e.g., Burnett, 1999), self-talk may be actively used as a mechanism through which

individuals make sense of and process their environment (cf. Lawrence & Valsiner,2003). Thus the first study of this thesis investigated the effects of autonomy-supportive versus controlling environments on individuals' self-talk and motivation.

Building on the findings of the first experiment, the second study explored in greater detail the role of the functional significance of self-talk. It was proposed that functional significance represents a more detailed and meaningful way of examining self-talk, as opposed to purely content-driven methods. Study 2 describes the development of a measurement tool designed to assess the salience of self-talk to an individual. In addition, a key variable predicted by SDT to be influenced by informational and controlling events is well-being. Given the theoretical links between the functional significance of informational and controlling events and affective outcomes, and that research has shown that need satisfaction, motivation, and subsequent well-being can be influenced by inter-personal communications (e.g., Deci, Driver, Hotchkiss, Robbins, & Wilson, 1993), the potential influence of *intra*-personal communication on affective state seemed a pertinent area to examine. Therefore, Study 2 consisted of a cross-sectional design examining associations between informational and controlling interpretations of self-talk and affect.

Although need satisfaction was not measured in Study 2, based on CET in the model presented above it was hypothesised that associations between self-talk and affective and behavioural outcomes may be predominantly due to the impact of selftalk on need satisfaction. That is, self-talk that is experienced as controlling is likely to undermine basic needs, with subsequent detrimental consequences for affect and well-being. Conversely, informational self-talk was proposed to satisfy basic needs, resulting in positive outcomes including more self-determined motivation, enhanced well-being, and, in the context of athletic training, more desirable training behaviours.

Of the three outcome variables included in Figure 1, well-being was not considered in the present thesis, predominantly due to the wealth of previous literature on its causal precedents. As previously discussed, affect was examined in the second study, which sought to consider associations between informational and controlling self-talk and affective state. The main outcome of need satisfaction examined in this thesis was athletes' training behaviour. The rationale for this is presented below.

Athlete training behaviours.

Although much of the focus of SDT-oriented research has been on wellbeing, it is important to recognise that other variables are also of interest in the context of elite performance, given the dual concerns of performance enhancement and athlete care. Research which has examined the effects of need support and satisfaction on motivational, and in turn, behavioural outcomes, has tended to focus on whether or not individuals engage in a behaviour, or for how long. The quality of behavioural participation is rarely assessed. For example, research has examined the likelihood of free-choice task engagement (e.g., Deci, Eghrari, Patrick, & Leone, 1994), of long-term task persistence (e.g., Pelletier, Fortier, Vallerand, & Brière, 2001), of supervised and free-choice physical activity participation (e.g., Silva et al., 2008) and of adherence to prescribed treatment programs (e.g., Williams et al., 2002). Task engagement and persistence are theorised within SDT to result from the internalisation of behavioural regulation for a task, promoted under conditions which satisfy basic needs. Adherence to exercise training regimens has also been shown to be improved for those who report greater need support (and by implication, greater need satisfaction; e.g., Williams, Grow, Freedman, Ryan, & Deci, 1996). However, it is argued that from both an applied and theoretical perspective it is of interest to

examine in greater detail the behavioural consequences of need satisfaction, that is, how need satisfaction influences the way in which we engage in behaviour.

There are a number of reasons as to why this relationship was examined in the context of athletes' training. First, despite the importance of extended deliberate practice in attaining elite performance levels (Ericsson & Charness, 1994), and suggestions that elite athletes may spend up to 99% of their sport-related time practicing (McCann, 1995), there is a lack of research studying athletes' behaviours within the non-competitive environment. Second, although previous research has suggested that self-determined athletes may be less likely to experience burnout (Lonsdale, Hodge, & Rose, 2009), and persist in their sport for longer (Pelletier et al., 2001), research has not yet examined in detail the behavioural consequences of differing motivational regulations. For example, self-determined athletes may be enthusiastic, encourage teammates, and consistently try their hardest; conversely, controlled athletes may be disengaged, fail to fully concentrate on instructions, and put only minimal effort into drills or exercises. Furthermore, contextually an elite professional sport training environment permits only limited variation in attendance for training. It is of interest to understand to what extent athletes are engaging fully in training once they are there, not merely whether they are present or not. Lastly, it is of interest to study short-term changes in athletes' behaviour that might predict the likelihood of their drop-out in time, or their progress within the sport. Being able to identify athletes with non-optimal motivational states may enable the design of programmes or interventions designed to promote positive approaches to training for athlete development, progression and well-being. From a wider perspective, although research has established the consequences of need satisfaction in terms of well-being, predicting the quality of an individual's engagement in a task (particularly where

participation is compulsory) may have important implications in other domains (e.g., for business in terms of predicting productivity).

Considering this, Studies 3 and 4 in this thesis sought to identify important training behaviours, and to develop and validate a tool to measure these. Given a lack of consensus within the literature regarding which specific training behaviours are important for athlete development, and whether these behaviours are relevant across a range of sports, Study 3 explored training behaviours perceived to be important by coaches from team sports. Focus groups were conducted with high-level coaches to determine their perceptions of effective athlete behaviours within the practice environment. In Study 4 the framework constructed in Study 3 was used to develop self-report measures of athlete training behaviours. Study 4 reports the development of two training behaviours questionnaires, as well as the testing of their psychometric and concurrent validity.

Following this, the final study presented in this thesis uses the self-talk and training behaviours questionnaires developed in earlier chapters to test the full model depicted in Figure 1. Self-report data were collected from professional athletes to test a model in which coaches' need support had both direct (see previous research, e.g., Gagné, Ryan, & Bargmann, 2003) and indirect effects on need satisfaction, through informational and controlling self-talk. Furthermore, it was proposed that need satisfaction would be associated with athletes reporting a more productive and engaged approach to training, as evidenced by an increased incidence of positive training behaviours, and less negative behaviour.

Summary.

To summarise, the present thesis had three main purposes. First, to extend self-talk research by examining its antecedents and effects in the context of a

contemporary motivational theory. Second, using SDT as a framework, to test a model in which self-talk is a component of athletes' experience of the motivational environment in sport. The final aim of this thesis was to develop an understanding of athletes' behaviour in the training environment and the impact of self-talk on psychological need satisfaction and training behaviours. In order to achieve these aims, the effects of autonomy-supportive versus controlling environments on individuals' self-talk were examined, measures of informational and controlling self-talk and athletes' state and trait training behaviours were developed and validated, the relationships between the two types of self-talk and affect were explored, and the relationships between need support, self-talk, need satisfaction and behavioural outcomes were investigated in a high performance sports setting.

CHAPTER 2

THE EFFECTS OF AUTONOMY-SUPPORTIVE AND CONTROLLING ENVIRONMENTS ON SELF-TALK.

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Self-determination theory (SDT: Deci & Ryan, 1985, 1991) is an approach to understanding human motivation that holds that the satisfaction of certain innate psychological needs is the basis for self-motivation, psychological growth, and optimal well-being. Central to SDT is a consideration of the extent to which the regulation of a behaviour has become internalised and integrated into the person's sense of self so that they feel that they are self-determining in their activities. In addition, SDT specifies the social-contextual conditions that facilitate these processes (Ryan & Deci, 2000). Specifically, the theory posits that social contexts that provide support for the satisfaction of innate basic psychological needs for competence, autonomy and relatedness promote the natural processes of internalization, integration of the self, and healthy psychological development. Conversely, social contexts which thwart basic need satisfaction are considered antagonistic to psychological growth. Competence involves feeling that one can deal effectively with one's environment and having the capacity to effect outcomes. Autonomy is defined as a need for volition, for behaviour to be aligned with one's integrated sense of self combined with a perception that the self is the origin or driving force behind behaviour (Deci & Ryan, 2000; Reeve, Nix, & Hamm, 2003). Relatedness involves the need to experience connectedness with others and to have satisfying and supportive social relationships.

According to Deci and Ryan (2000), satisfaction of the needs for competence and relatedness can facilitate the partial internalization of behavioural regulation but for regulation to be fully internalised, support for autonomy is essential. Thus in SDT satisfaction of the need for autonomy is conceptualised as the critical element in the development of self-determined forms of motivation and in turn the positive behavioural and affective outcomes associated with this (Deci & Ryan, 2000). Given this emphasis on the importance of autonomy, much SDT research has attempted to

determine specific contextual elements that characterise an autonomy-supportive environment. For example, Reeve (2002) has delineated specific behaviours associated with autonomy support. They include developing a personally meaningful rationale for engaging in a behaviour, minimizing external controls such as contingent rewards and punishments, providing opportunities for participation and choice, and acknowledging negative feelings associated with engaging in difficult tasks. Further proposed features of autonomy-supportive environments include the provision of informational feedback (Ryan & Deci, 2006) and shared decision-making (Reeve, Bolt, & Cai, 1999).

There has been relatively consistent support for the predictions made within SDT regarding the benefits of autonomy-supportive environments compared to more controlling contexts. Autonomy-supportive environments have been positively associated with more self-determined forms of behavioural regulation (e.g., Grolnick, Ryan, & Deci, 1991; Gagné, Ryan, & Bargmann, 2003), enhanced performance and persistence, more in-depth information processing, and greater well-being (Cooper, Okamura, & McNeil, 1995; Vansteenkiste, Simons, Lens, Soenens, & Matos, 2005). Both interpersonal behaviours and the content and the nature of communications from others have been conceptualised as key determinants of whether an environment is perceived as autonomy-supportive or controlling. For example, in an early experimental study, Koestner, Ryan, Bernieri, and Holt (1984) examined the effects of interpersonal style, contrasting the effects of informational and controlling limitsetting styles. It was found that children's intrinsic motivation, enjoyment, and painting quality were undermined by a controlling style and locution relative to an informational or no-limits condition. Experimental studies have provided additional support for the notion that interpersonal communications can affect the extent to

which the environment supports autonomy and promotes autonomous regulation of behaviour. Deci, Eghrari, Patrick, and Leone (1994) manipulated the social context of a computer-based targeting task using the presence or absence of three experimenterdelivered factors: providing a meaningful rationale, acknowledging participants' feelings about the behaviour, and conveying a sense of choice. The final factor was altered by the language used by the experimenter (e.g. "you must, you have to, you should" versus "you might like to, if you would like to"). Deci et al. (1994) found that when at least two of the three facilitating factors were present, participants' behavioural regulation was more self-determined. Participants also reported a greater sense of value and enjoyment for the activity. These results mirror findings from an earlier study by Deci, Driver, Hotchkiss, Robbins, and Wilson (1993) who found that the percentage of controlling vocalizations used by mothers during play correlated negatively with children's free-choice behaviour and self-report of interest in the target activity. Vansteenkiste et al. (2005) found similar effects when manipulating the autonomy supportive nature of written instructions for a task. They reported that autonomy-supportive communication was positively related to perceived autonomy for the task, as well as enhanced conceptual learning after both long and short term testing. To summarise, the research findings discussed above suggest that controlling behaviours and communications undermine autonomy relative to autonomysupportive interactions.

Whilst there has been a considerable amount of research within SDT regarding the effects of social context on motivational state, need satisfaction and outcome measures such as well-being or behaviour, little is known about how individuals cognitively process and respond to controlling or autonomy-supportive environments. A specific indicator of cognitive content that has received increased attention within

the past decade is self-talk. Historically, a number of terms have been used to refer to self-talk including inner speech, internal dialogue, private speech, verbal rehearsal and egocentric speech (Depape, Hakim-Larson, Voelker, Page, & Jackson, 2006). Private speech has been defined as overtly vocalized speech directed to oneself (Duncan & Cheyne, 1999). In the present study self-talk was broadly conceptualised as a multidimensional phenomenon concerned with verbalizations addressed to oneself, either overtly or covertly (cf. Hardy, Hall, & Hardy, 2005).

Thus far, research examining antecedents of self-talk is relatively sparse, perhaps due to conceptual and measurement difficulties involved in investigating selfverbalizations (Meichenbaum & Butler, 1979; Ericsson & Simon, 1993). Some research has shown that self-talk can be predicted by task or environmental conditions, with individuals using private speech more frequently in more difficult tasks (Behrend, Rosengren, & Perlmutter, 1989). Such findings have been interpreted as support for the premise that self-talk predominantly serves a self-regulatory function (Fernyhough & Fradley, 2005). Of greater relevance to the present investigation, the behaviour of others has been related to individuals' selfverbalizations. Within an educational setting, Burnett (1999) showed that teachers' positive statements were associated with positive self-talk in their students. More recently, Zourbanos, Theodorakis, and Hatzigeorgiadis (2006) found that coaches' negative activation behaviours, including behaving inappropriately or in a distracting manner, were directly related to athletes' thoughts of failure and negative self-talk.

Although social-contextual factors may directly affect the content or type of self-talk, it is also possible that self-talk may be actively used as a mechanism through which individuals make sense of and process their environment. Lawrence and Valsiner (2003) suggested that self-talk facilitates the interpretation and

internalization of social messages, proposing a model by which individuals internalise and transform social messages through dialogue with themselves or imagined others. Additionally, self-talk has been shown to mediate the relationship between teacher feedback and changes in self-concept, with students using self-talk to respond to information from others and internalizing it whilst altering their perceptions of themselves (Burnett, 2003). It may be that the type of self-talk used by individuals varies as a function of social communications/context, and that this in turn causes changes in motivational and affective states. If cognitions are fundamentally linked to behaviour and emotion (Genest & Turk, 1981), then studying individuals' cognitions in different social contexts may enhance our knowledge of the processes by which autonomy-supportive and controlling environments affect these variables.

Thus the aim of the present study was to examine the effects of autonomysupportive and controlling environments on the nature and content of individuals' self-talk. Specifically, as research has shown that individuals in an autonomysupportive environment report greater enjoyment, positive affect, satisfaction and psychological adjustment relative to controlling contexts (e.g., Cooper et al., 1995; Black & Deci, 2000), it was hypothesized that self-talk produced under autonomysupportive conditions would reflect a more autonomous form of behavioural regulation, through the use of more autonomy-reflective words (e.g., I can, I choose to) and fewer controlling words (e.g., I must, not allowed), compared to self-talk in a controlling condition. This would support previous findings that autonomous versus internally and externally controlling regulations can be manipulated by communication styles (Vansteenkiste et al., 2005), and that language used in self-talk can be modelled from others (Lantolf, 2006). It was also hypothesized that differences in the number of first, second, and third person references would emerge,

with individuals in a controlling environment making reference to an external controlling source or third party explicitly (e.g., you, it, they), and using less first-person references. Finally, Deci and Ryan (2000) proposed that controlling contexts can result in conflict, alienation, anxiety, and depression as well as controlling regulatory processes and compensatory goals. Therefore it was hypothesized that, relative to a controlling environment, self-talk produced in an autonomy supportive environment would include more expressions of positive emotions and fewer expressions of negative emotions. As research has shown that swearing is used to express negative emotions (Rassin & Muris, 2005), it was also hypothesized that participants in the controlling condition would use more swear words.

Method

Participants

Seventy university student volunteers (16 male, 54 female) with a mean age of 24.19 (SD = 9.07) were recruited via signup sheets during lectures and email advertisements. No course credit was given for participation. Participants were randomly assigned to one of two experimental groups, an autonomy-supportive or a controlling condition.

Measures

Self-talk. Participants' self-talk was recorded during a ten-minute maze task using a 'think aloud' protocol. The 'think aloud' method of cognitive assessment has been used in a number of studies and typically produces a large quantity of verbal data compared to thought listing techniques (Blackwell, Galassi, Galassi, & Watson, 1985). Thinking aloud involves participants continuously verbalising thoughts as they enter awareness, without editing or explanation processes (Ericsson & Simon,

1993). All self-talk was digitally recorded then transcribed verbatim for further analysis.

A self-talk measurement check based on Peters and Williams' (2006) measure was also included, which assessed the extent to which participants verbalized all their thoughts during the ten-minute trial period. Participants marked a visual analogue scale which ranged from 0 (*not at all*) to 100% (*all the time*). Participants were also asked to list anything that they did not 'think aloud' in order to test for any differences in overt and covert self-talk between the conditions.

Manipulation check.

It has been shown that when the need for autonomy is frustrated, the tendency for participants to engage in a task in a willing and volitional nature is reduced (Vansteenkiste et al., 2005). Therefore, to determine that autonomy-supportive and controlling environments had been successfully produced, a free-choice protocol was employed. A free choice situation involves recording the extent to which participants persist with a target activity (in this case the maze program) during a period subsequent to the experimental phrase, when the option of an alternative activity is provided (Deci, Koestner, & Ryan, 1999). In addition, participants completed a taskspecific version of Vansteenkiste et al.'s (2005) four-item measure of perceived autonomy (e.g., "I felt like it was my own choice to do the mazes"). Items were rated on a 5-point Likert-type scale ranging from 1 (not at all) to 5 (very much). Vansteenkiste et al. (2005) previously used this scale as a manipulation check and reported that it showed good reliability ($\alpha = .80$). Participants also completed interest/enjoyment, pressure/tension and perceived choice subscales adapted from McAuley, Duncan and Tammen's (1987) Intrinsic Motivation Inventory. Example items include "I found the task very interesting" (interest/enjoyment), "I felt tense
while doing the task" (pressure/tension), and "I felt that it was my choice to do the task" (perceived choice); all subscales were rated on a 7-point Likert scale ranging from 1 (*not at all true*) to 7 (*very true*). In line with previous findings (e.g., Deci et al., 1994; Vansteenkiste et al., 2005) it was expected that participants in the controlling as opposed to the autonomy-supportive condition would demonstrate less free-choice time activity as well as report lower interest/enjoyment, lower perceived choice and higher pressure/tension.

Procedure

Prior to informed consent being obtained, participants received an information sheet explaining that the purpose of the study was to examine the use of self-talk during problem solving activities, and were informed that testing would be audio and video recorded. An information sheet, informed consent form, and ethics review documents are included in Appendices A, B, and C. The experimental trial consisted of a ten-minute period during which participants were asked to 'think aloud' whilst attempting a series of computer-presented mazes in a laboratory environment. Participants were instructed to navigate from start to end points in the mazes using arrow keys. If a maze was completed participants moved onto the next one, and so on until the ten minute period had elapsed. The mazes were selected as pilot testing had indicated that participants were able to produce an acceptable frequency of verbalizations whilst undertaking the task, and that the level of task difficulty was appropriate, in that it was moderately difficult (all participants were able to complete at least one maze in the time provided and no participants completed the whole series of four mazes). A moderately difficult task was sought as studies have shown that these conditions elicit the greatest frequency of self-verbalizations (Diaz, 1992).

Prior to commencing the trial period, participants were introduced to the concept of thinking aloud, and completed practice activities such as those described by Ericsson and Simon (1993; e.g., thinking aloud whilst working out the number of windows in your house). Once the experimenter was satisfied that the participant had fully understood thinking aloud, participants were seated at a computer terminal and received instructions regarding the experimental task. To create autonomy-supportive and controlling conditions an adapted version of Deci et al.'s (1994) protocol was used, in which social context was manipulated by the presence or absence of three experimenter-delivered factors; providing a meaningful rationale for the task, acknowledging feelings, and conveying a sense of choice. In the autonomy-supportive condition all three facilitators were present, whereas in the controlling condition none were present. The following rationale and acknowledgment of the participants' potential negative feelings regarding the task were provided in the written and verbal instructions:

"Doing this activity has been shown to be useful, as we have found that participants who have done it have learned about their own concentration and problem solving skills. This has occurred because the activity involves focused attention, which is important in concentration. I know that doing this is not much fun; in fact many participants have told me that it's pretty boring, so I can understand and accept that you might not find it very interesting".

The final factor, conveying a sense of choice, was altered by the language used by the experimenter in both the verbal instructions and the written instructional set provided (e.g. "you must, you have to, you should" versus "you might like to, if you would like to"). For example, the controlling group were told "I will first explain what you should do and I will tell you when to begin", whereas the autonomy-

supportive group were told "I will first explain what to do and you can decide when to begin". Scripts of verbal instructional sets are included in Appendix D.

Following a sixty-second practice period participants were given the instructions again in written form before beginning the ten-minute trial. Written instructional sets are included in Appendix E. Once the ten minute trial had been completed, participants were informed that the experimenter had to leave to collect an additional questionnaire, and that they could continue working on the maze problems whilst waiting. General interest magazines were placed in the room so that participants were presented with a free choice situation. During a 5-minute free choice period time spent on the activity was recorded using video surveillance. After 5 minutes had elapsed the experimenter returned and participants were asked to complete the set of previously described questionnaires and were then fully debriefed. *Data Analysis*

All recordings were transcribed verbatim then primarily analysed using the Linguistic Inquiry and Word Count (LIWC) program (Pennebaker, Francis, & Booth, 2001). This lexical frequency software calculates rates of word usage for a range of categories including standard linguistic dimensions (e.g., first, second, and third person references) and more advanced conceptual categories such as affective or emotional processes (e.g., positive feelings: happy, joy, love). A custom dictionary was developed in order to test for words that reflect controlling or autonomous selftalk (e.g., controlling: should, must, have to; autonomous: free, choose, could).

Additionally, transcripts were content analysed to identify any differences in patterns of thoughts or phrases between the two conditions in order to allow a more in-depth understanding of the nature of self-talk used than word frequencies alone. Following a similar procedure to Scanlan, Stein and Ravizza (1989), inductive content

analyses were carried out separately for self-talk from the autonomy-supportive and controlling conditions. Two researchers independently familiarised themselves with the transcripts and audio files and divided the data into meaningful units of analysis. Units ranged in length from single words to complete sentences and were defined as statements that were "self-definable and self-delimiting in the expression of a single, recognizable aspect of the subject's experience" (Cloonan, 1971, p.117). Following this initial step any discrepancies were discussed until a consensus was reached.

Similar units were then clustered based on internal homogeneity and external heterogeneity, in order to identify raw data themes. Again, the two researchers conducted this process independently then any divergence was discussed until consensus was reached. Finally, the raw data themes were clustered into higher order themes through discussion which achieved consensual agreement. This was implemented as it allows a more thoughtful and more accurate conceptualization of the resulting clusters than more nomothetic interjudge agreement methods (Hill, Thompson, & Williams, 1997).

As recommended by Lincoln and Guba (1985), post-construction checks of 'trustworthiness in the analysis' were also conducted. First, a disinterested peer was asked to match the lower-order themes into higher order categories. The agreement rate was 100% which suggested that the rationale behind higher-order classification was logical and transparent. A form of member checking was also conducted, in which one participant from each experimental condition read the first order category labels given to units of self-talk and was asked to indicate whether the labels accurately reflected the content of the statements. Both participants agreed that labels were accurate and representative, with two minor modifications made; the category

originally labelled 'Motivational' was relabelled 'Encouraging' and the category originally labelled 'Attentional Focus' was relabelled 'Concentration/Focus'.

Results

Descriptive statistics

Cronbach's alpha reliabilities for the questionnaire measures were as follows: interest/enjoyment = .94; perceived choice = .83; pressure/tension = .87; perceived autonomy = .89. Examination of skewness and kurtosis for the perceived autonomy subscale revealed that the assumption of normality was violated (skewness = 1.543, SE = .291; kurtosis = 1.957, SE = .574). Further examination revealed a restricted scoring range with only 4.2% of respondents reporting a mean score across the four items of ≤ 2 (possible scoring range = 1 to 5). Out of 280 possible responses (four items for each participant), the lowest scale point (1) was selected only 15 times. Taken together, this suggests that the scale did not adequately differentiate participants' perceived autonomy, and it was subsequently eliminated from further analyses.

Bivariate correlations between the variables of interest are shown in Table 1. Interest/enjoyment and perceived choice were moderately positively correlated, and pressure/tension was negatively correlated with perceived choice. Time spent on the task during a free choice period was not significantly related to any of the self-report variables, nor to any self-talk categories. Frequency of assents and positive emotion words were strongly and positively correlated (r = .814), as were negative emotion words and swearing (r = .906). However, this was not considered problematic as the LIWC dictionary categorizations indicate that words included within each category are mutually exclusive and conceptually distinct.

Table 1

Means, Standard Deviations and Bivariate Correlations

	М	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	4.72	1.34														
2	3.24	1.411	3													
3	5.89	1.08 .3	895**	302*												
4	4.25	0.98 .2	23	280*	.755**											
5	106.48	105.49 .1	5	20	.00	04										
6	1.70	1.21 .1	3	01	.05	.01	10									
7	0.71	0.57 .0)8	16	11	01	.01	.04		*						
8	7.22	3.103	380**	.259*	257*	11	02	06	.11							
9	0.82	0.960)8	04	.07	.00	05	.18	10	297*						
10	0.24	0.562	20	12	08	.00	13	.09	06	12	.334**					
11	2.72	1.49 .1	14	03	.02	07	03	.17	.20	19	17	237*				

TABLE CONTINUED

12	1.94	1.75 .309**	*295*	.15	.17	.11	.11	.12	312**	*10	.17	.19		
13	2.28	1.64 .19	319**	.08	.07	.08	.06	.10	314**	* .00	.251*	01	.814**	
14	2.36	1.9402	.14	.03	.16	.01	13	20	.11	10	.01	.00	.01	12
15	1.11	1.70 .05	.14	.10	.14	12	09	15	.01	01	03	01	05	11 .906**

1 Interest/Enjoyment, 2 Pressure/Tension, 3 Perceived Choice, 4 Perceived Autonomy, 5 Time FCB, 6 Autonomous ST, 7 Controlling
ST, 8 1st person, 9 2nd Person, 10 3rd Person, 11 Negates, 12 Assents, 13 Positive Emotions, 14 Negative Emotions, 15 Swearing.
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

Self-Talk Measurement Check

The mean percentage of self-talk that participants reported verbalising during the trial period was 73.1%. Participants listed a mean of 23.39 (SD = 39.46) words of covert self-talk, which equated to 5.2% of their overt self-talk. Although it is possible that some of the participants' covert self-talk was unreported, or that participants were unable to accurately perceive how much they 'thought aloud', these findings do suggest that participants verbalised the majority of their self-talk. An independent samples *t*-test indicated that there was no significant difference in the frequency of non-verbalized self-talk between the two conditions, $t_{(68)} = -.970$, p = .351. Therefore it was considered appropriate to examine differences in overt self-talk between conditions.

Autonomy support manipulation check

Independent samples t-tests revealed that participants in the autonomysupportive condition (M = 162.14, SD = 96.88) spent significantly longer on the maze task during the free choice period as compared to their controlling condition counterparts (M = 46.06, SD = 73.41; t = 5.11, p < .001). Participants also reported significantly higher interest/enjoyment in the autonomy-supportive condition (M =5.16, SD = 1.23) than those in the controlling condition (M = 4.27, SD = 1.31; t =2.93, p = .005). Participants in the autonomy-supportive condition reported lower pressure/tension (M = 3.01, SD = 1.38) than those is the controlling condition (M =3.46, SD = 1.43; t = 1.34, p = .184), however, this was non-significant. There was no significant difference between the groups on perceived choice (t = .451, p = .654). *Self-Talk Variables*

A discriminant function analysis was carried out to determine whether the two groups differed along the dimensions of self-talk identified by the LIWC analysis. The predictor variables included were those about which a priori hypotheses were made, that is positive emotions, negative emotions, first, second and third person references (labelled *self*, *you*, and *other* respectively within LIWC dictionary), assents (positive assertions), negations (negative assertions), swear words, autonomous words and controlling words. This resulted in a total of 10 predictor variables. Table 2 shows the means, standard deviations and standardized discriminant function coefficients.

After the removal of multivariate outliers, the final sample size for this analysis was 65. Box's M was significant (p = .002) however, in line with the recommendations of Tabachnick and Fidell (2001), given that the group sizes were not notably different this was not considered problematic. Results revealed a significant discriminant function (Wilks' $\lambda = .632, \chi^2(10) = 26.61, p < .05$). Using the recommended cut-off of >.30 (Tabachnick & Fidell, 2001), examination of the structure coefficient matrix identified that five self-talk categories contributed meaningfully to the discriminant function: Assents (-.666), Positive Emotions (-.506), Swearing (.415), Negative Emotions (.398) and Self (.381). The discriminant function resulted in the correct classification of 78.5% of participants; 78.1% from the controlling and 78.8% from the autonomy-supportive condition. Group centroid means were also examined as Tabachnick and Fidell (2001) state that if there is a large difference between group centroids along a discriminant function then this provides additional evidence that the groups can be discriminated. Moreover if centroids are large and in the opposite direction, then group discrimination is more distinct (Biddle, Markland, Gilbourne, Chatzisarantis & Sparkes, 2001). In the present analysis the group centroid means were -.740 for the autonomy-supportive and .763 for the controlling condition.

Table 2

	Ex	perimenta	al Conditio	on			
	Auton Suppo (n =	omy- ortive 32)	Contro (n =	olling 33)	-		
Variable	Mean	SD	Mean	SD	Structure Coefficient		
Assents	2.64	1.78	1.14	1.12	666		
Positive Emotions	2.80	1.65	1.66	1.32	506		
Swear	0.61	0.96	1.66	2.18	.415		
Negative Emotions	1.82	1.42	2.94	2.24	.398		
First Person	6.30	2.93	7.96	2.89	.381		
Negations	2.93	1.49	2.57	1.37	168		
Second Person	0.72	0.87	0.94	1.04	.154		
Controlling	0.65	0.54	0.77	0.58	.133		
Autonomous	1.73	1.14	1.71	1.34	009		
Third Person	0.19	0.42	0.19	0.27	.006		

Self-Talk Means and Standardized Discriminant Function Coefficients

Qualitative Content Analyses

Results from the final analyses are shown in Figures 1 and 2. It can be seen from the figures that there was a great deal of consistency between the types of selftalk that emerged from each condition. Under both conditions, a total of 34 raw themes emerged which were ultimately clustered into four higher order categories, positive task focused speech, negative task focused speech, non-task focused speech, and non-self-directed speech. The latter category comprised statements that were not considered self-talk (e.g., asking the experimenter a question) and thus was not considered further. The content analyses revealed that participants from both conditions used all three general categories of self-talk. Similarity in participants' self-talk was also evident following examination of the more detailed lower order

themes. When positively focusing on the task, participants in both conditions used self-talk to describe their situation, plan actions, provide feedback on their current performance, and instruct themselves. Conversely, when focused on the task in a negative manner, participants from both conditions used self-talk relating to the difficulty of the task, their dislike of the task, self-criticism regarding progress, and feelings of being tricked or deceived (usually in relation to participants' suspicion that there was not a solution to the puzzle). Non-task focused speech encompassed selftalk relating to the participants' feelings, and also irrelevant thoughts, such as 'I wonder what I'm going to have for tea tonight'. Across these categories, there were three types of self-talk which were unique to either the autonomy-supportive or the controlling condition; 'concentration/focus' and 'positive feelings' (autonomysupportive condition only) and 'being thwarted' (controlling condition only). Concentration/focus encompassed phrases referring to increasing concentration and attention to the task, for example "keep your head on the game" and "ok, think, focus". These phrases were considered semantically different from the more general encouraging/motivational category as they referred explicitly to enhancing task focus rather than overall performance. The positive emotions category refers to self-talk in which participants stated their current feelings as positive, such as "this is exciting". Finally, the category 'being thwarted' contained phrases which appeared to refer to an external agent restricting progress through the maze, such as "I just feel like I'm getting blocked everywhere I go".

Examining the extent to which participants used categories of self-talk highlighted additional differences between the two conditions. It was noted whilst conducting the analysis that although similar phrases had been used in both conditions, the extent to which participants used these differed. In a similar fashion to

Zecevic, Salmoni, Speechley, and Vandervoort (2006), a unit frequency graph was compiled to further illustrate differences between the two content analyses (see Figure 3). This shows a differing pattern in the frequency of self-talk content across the two conditions, in that fewer controlling or restrictive (e.g., explicit instructions, selfcriticism) and more informative (e.g., feedback regarding task progress, planning) statements were used in the autonomy-supportive condition.

Figure 1. Content Analysis Autonomy-Supportive Condition - Higher Order

Structure.

Raw Themes



Figure 2. Content Analysis Controlling Condition – Higher Order Structure.

Raw Themes





Figure 3. Selective Unit Frequency Comparison for Autonomy-Supportive and

Controlling Experimental Condition.

The purpose of this study was to examine whether self-talk differed in autonomy-supportive and controlling environments. Importantly in the context of the present study the manipulation of social context through the use of instructional style appeared to be successful. Consistent with previous SDT-based research (e.g., Deci et al., 1994), participants in the controlling condition engaged in significantly less freechoice behaviour and reported significantly lower interest/enjoyment for the task than

those in the autonomy-supportive condition. There was also a trend for participants in the controlling condition to report higher pressure/tension than those in the autonomy-supportive condition.

By analysing participants' self-talk data using both quantitative and qualitative inductive approaches it was possible to conclude that differences existed between the two conditions that were predominantly consistent with the a priori hypotheses. Specifically, based on previous findings that controlling environments thwart need satisfaction, resulting in negative emotional consequences (e.g., Grolnick & Ryan, 1987), it was unsurprising that participants' self-talk contained more expressions of negative emotions and more swearing. Additionally, in the autonomy-supportive condition participants' enhanced enjoyment of the task was also reflected in greater use of positive emotion words and assents. However, contrary to expectations, participants in the controlling condition used more first-person references than the autonomy-supportive condition. It is possible that when autonomy was threatened, individuals may have attempted to buffer the effects of this control and reinforce the role of the self by emphasizing a personal perspective in their self-talk. The use of self-talk as a form of coping has been previously reported (e.g., Tamres, Janicki, & Helgeson, 2002), and in the present study this effect is in line with the principals of reactance theory (Brehm & Brehm, 1981). Reactance theory proposes that perceived threats to the freedom of an individual can trigger a motivational state known as reactance, which leads to efforts to restore one's freedom which may include problem-solving, rebellion, or cognitive distortion (Brehm & Brehm, 1981; Deci & Ryan, 1985). It is possible that the greater use of first person references reflected a state of reactance as a result of restrictions created by the controlling environment.

However, given that second or third person references did not discriminate between the conditions, the mechanism underlying this finding requires further examination.

With respect to the LIWC data, it was also surprising that no differences were found between the two conditions regarding the use of words classified as controlling or autonomy-supportive. This could be due to the limitations of lexical frequency analysis programs in terms of their dependence on measuring the content of a word, rather than its interpretation by an individual. For example, the phrase 'You have to do this' could be used as a 'psyching up' tool, and may be interpreted as being autonomy-supportive and motivational by some individuals, whereas the same phrase could also be perceived as controlling or pressurising by others. Future research should focus on the interpretation or functional significance of self-talk content to the individual in order to more appropriately measure and assess its effects.

Finally, previous studies have reported differences in perceived choice between controlling and autonomy-supportive conditions (e.g. Vansteenkiste et al., 2005); however, no differences emerged in the current study. The mean scores for both conditions on this subscale were high, perhaps reflecting the voluntary commitment made by participants to engage in the experiment. Additionally, the responses indicating lower interest and enjoyment for the task and less time spent on the task during a free choice behaviour period in the controlling condition suggest that although participants may not have consciously perceived or explicitly recognised the environment as limiting choice or being controlling, they nevertheless experienced it as such.

Qualitative examination of the data complemented the findings of the quantitative analyses, in that participants in the autonomy-supportive condition used more informational (e.g., feedback and strategic), more positive emotional, less

controlling (e.g., instructional and self-critical) and less negative emotional self-talk than participants in the controlling condition. Moreover, positive emotions were only expressed by participants in the autonomy-supportive condition. Consequently, supportive evidence associating positive affect and well-being with autonomysupportive environments was generated. Additionally, only participants in the autonomy-supportive condition used self-talk to regulate their concentration on the task. Evidence of self-regulation under autonomy-supportive conditions is consistent with the assertion that when autonomously engaged, individuals' actions are selforganised rather than merely cued or prompted (Deci & Ryan, 2000).

Under controlling conditions, the emergence of self-talk relating to a feeling of being thwarted by an abstract external entity is somewhat consistent with the hypothesis that more controlling environments induce an external perceived locus of causality (Reeve et al., 2003). It is possible that, when being controlled, participants were more likely to attribute progress on the task to external factors. Conversely, as from the experimenter's observations this type of self-talk seemed to be used when participants were having difficulty with the task (i.e., when their chosen route was blocked or they could not find the correct path), it may be that when an external locus of causality is fostered, participants become more likely to blame others for their performance failings. Blaming others has been shown to be an avoidant coping style associated with external attributions for events (Clement & Schonnesson, 1998).

Findings that participants in the autonomy-supportive condition used more informational and less controlling self-talk than participants in the controlling condition offer partial support to Lantolf's (2006) proposition that self-talk is modelled from one's social surroundings. It is plausible that, whilst specific words (e.g., should, must, have to) were not modelled in participants' self-talk, more

controlling conditions result in individuals adopting more restrictive types of self-talk (e.g., self-critical). It could also be argued that the pattern of self-talk that emerged from the two conditions bears some overlap with types of self-talk previously reported in the literature. In particular, in a study of tennis players Van Raalte, Brewer, Rivera, and Petitpas (1994) identified the use of positive motivational self-talk (e.g., 'let's go') and instructional self-talk (e.g., 'move your feet') as well as negative self-talk which consisted of statements expressing frustration or a fear of failure (e.g., 'oh God, that's horrible'), and negatively expressed self-instruction (e.g., 'don't hit it that way'). That similar categories of self-talk emerged within the current study suggests participants' self-talk was reflective of that reported in natural settings.

When interpreting the results of the current study it is important to consider a number of limitations. Using verbalizations as data may have resulted in the non-reporting of some important types of self-talk, as it is inevitable that some form of thought editing will occur when participants think aloud. Although the finding of clear differences between the groups that were relatively consistent with the hypotheses suggests that measuring self-talk in the current manner did produce valid data, accurately measuring self-talk is an issue that requires further consideration. An additional limitation of the study is that although the inductive content analysis provided a more in-depth examination of the data available and provided some support for the quantitative findings, such a procedure has inherent weaknesses. Content analyses do not allow the identification of the most important or salient categories that emerge; for example, it may be that one of the less-frequent types of self-talk (e.g., self-criticism) is particularly salient to the individual's experience. Furthermore, content analyses can be susceptible to subjectivity in terms of the researchers' interpretation and classification of the data. The effects of this were

minimized by conducting multiple independent analyses and following recommended guidelines for establishing trustworthiness (Lincoln & Guba, 1985).

Despite these limitations, the findings of this study have a number of important theoretical implications. As well as contributing to the limited body of literature examining antecedents of self-talk, this study highlights the influence of the social environment and interpersonal communication on cognitive processes. This supplements existing SDT-based research which identifies the impact of autonomysupportive and controlling environments on need satisfaction, motivation, and emotional well-being by identifying that cognitive variables are also affected. This is important given the potential for cognition to influence affective state, motivation, and behaviour. For example, as previous studies have identified positive relationships between positive self-talk and affective states (e.g., Hardy, Hall & Alexander, 2001), effort (Wolters, 1999), and performance (e.g., Behrend et al., 1989), the promotion of autonomy-supportive environments in order to maximize individuals' use of positive self-talk is recommended.

CHAPTER 3

INTERPRETATION OF SELF-TALK AND POST-LECTURE AFFECTIVE STATES OF HIGHER EDUCATION STUDENTS: A SELF-DETERMINATION THEORY PERSPECTIVE.

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Identifying factors that influence students' affect and well-being is an ongoing concern within educational literature. Research monitoring the well-being of university students has shown that they experience heightened levels of anxiety on entry to higher education (Cooke, Bewick, Barkham, Bradley, & Audin, 2006), and previous work has focused on potential ways to improve well-being. For example, researchers have examined the role of financial and pastoral institutional support, (e.g., Nettles & Perna, 1997), as well as teaching styles and course structures (e.g., Taylor, 2005). However, there is limited research examining the ways in which students themselves cope with specific stressors (e.g., intellectually challenging topics). In the present study it is suggested that self-talk may represent a useful way of enhancing students' abilities to cope with the challenges of higher education.

Research methods and statistics courses have consistently been identified as a significant source of stress for undergraduate students (e.g., Zeidner, 1991). In the sciences, statistics modules typically form a core element of undergraduate teaching, which students must pass in order to progress, and are often unpopular and perceived as difficult due to their complex, technical nature (Ball & Pelco, 2006). Consequently, the identification of strategies that might enhance students' coping and reduce the anxiety associated with such stressors would be likely to have important applied implications concerning both progression and well-being.

One such psychological strategy that may be related to coping and well-being is self-talk. Historically, a number of terms have been used to refer to self-talk including inner speech, internal dialogue, private speech, verbal rehearsal, and egocentric speech (Depape, Hakim-Larson, Voelker, Page, & Jackson, 2006). In the present study self-talk was broadly conceptualised along similar lines as a

multidimensional phenomenon concerned with verbalizations addressed to oneself, expressed either overtly or covertly (cf. Hardy, 2006).

Previous educational research has shown that learners actively use self-talk to guide, plan, and monitor their own activity (Diaz & Berk, 1992), with increases in self-talk linked to enhanced self-regulation (Nelson & Van Meter, 2006). The potential beneficial effects of self-talk are highlighted by research findings revealing that students' use of positive self-talk in the classroom is associated with elevated self-esteem (Burnett & McCrindle, 1999) and that motivational strategies including mastery and performance self-talk positively predict learning, effort, and classroom performance (Wolters, 1999). Additionally, studies in sport and physical education have shown that both the content and interpretation of one's self-talk are related to a number of important outcome variables. For example, positive and instructional self-talk have been shown to improve learning (Cutton & Landin, 2007), enhance persistence and effort (Peters & Williams, 2006), and to improve performance and attainment levels (Hamilton, Scott, & MacDougall, 2007).

Given the pervasiveness of theoretical links between cognition and affect (e.g., Beck, 1976; Lazarus, 1991; Meichenbaum & Butler, 1979), and that cognitive theories of anxiety assert that self-talk lies at the core of anxiety (Conroy & Metzler, 2004), it is perhaps surprising that only limited research has explicitly focused upon the relationship between self-talk and affect. However, there are some findings to suggest that content of self-talk is directly associated with well-being. Calvete et al. (2005) reported moderate negative correlations between types of positive self-talk, including minimizing problems and presenting a positive orientation, and anger, depression, and anxiety among undergraduate students. Kendall and Treadwell (2007) found that children's use of anxious self-talk (e.g., "I wish I could do things right";

"Why do these things happen to me?") consistently predicted anxiety, and that changes in the use of anxious self-talk mediated the beneficial effects of cognitive behaviour therapy.

Studies from the sports domain provide further evidence that self-talk may be related to affect in stressful environments. Hardy, Gammage, and Hall (2001) found that athletes use self-talk to control pre-competition anxiety as well as to cope in challenging and difficult situations. Conroy and Metzler (2004) reported that distinct patterns of athletes' negative self-talk (i.e., self-controlling, self-neglecting, selfattacking, and self-blaming self-talk) were positively associated with sport anxiety. Intervention studies in sport also support a link between self-talk and anxiety. Hatzigeorgiadis, Zourbanos, and Theodorakis (2007) reported that both cognitive (worry) and somatic (interpretation of physical symptoms) forms of anxiety were lower when participants used anxiety-control self-talk (e.g., "calmly") compared to instructional self-talk (e.g., "ball-target"). Taken together these findings offer some support for the proposition that it may be possible to use self-talk to help cope with stressors.

Although research has established links between different types of self-talk and affect, well-being, and other outcomes, this literature can be criticised for lacking a coherent theoretical basis (cf. Hardy, 2006). In addition, research has tended to focus on the content of self-talk, rather than its interpretation or the function it may serve for the individual. Self-determination theory (SDT: Deci & Ryan, 1985, 2000) provides a framework which could further our understanding of how self-talk might be linked to well-being. SDT is a theory of motivation which posits that humans possess innate psychological needs to experience autonomy, competence and relatedness and that the satisfaction of these needs is essential for personal growth and

well-being (Deci & Ryan, 2000). The need for autonomy refers to a need to act with volition, rather than feeling controlled or compelled to act. The need for competence concerns the need to deal effectively with one's environment and effect outcomes. The need for relatedness involves a need to experience close and satisfying relationships with others. According to SDT, greatest well-being is experienced when these needs are satisfied, whereas thwarting of needs is likely to result in ill-health, negative psychological states, and poor well-being (Ryan & Deci, 2000).

Cognitive evaluation theory (CET: Deci & Ryan, 1985), a sub-theory within SDT, posits that events relevant to the initiation and regulation of behaviour can have one of three aspects that impact upon psychological need satisfaction and subsequent well-being. Informational events facilitate need satisfaction by providing effectancerelevant feedback and the experience of choice. Controlling events undermine need satisfaction by engendering pressures to act in particular ways. Finally, amotivational events facilitate perceptions of incompetence and promote amotivation. Importantly, in terms of their functional significance, CET makes no distinction between externally administered events, such as the provision of feedback or rewards by others, and intrapersonal events such as self-monitoring, self-reinforcement and self-control (Deci & Ryan, 1985). Thus CET proposes a distinction between internally informational regulating events which occur within the person and are experienced as free from pressures, and internally controlling regulation in which the individual pressurises themselves to act (Ryan, 1982). Deci and Ryan (1985) argue that to regulate oneself informationally is quite different from regulating oneself controllingly, and that controlling self-regulation is likely to have negative consequences for motivation and well-being. Drawing on this theoretical framework, self-talk is argued to represent an internal regulatory event that can be experienced as informational or controlling, with

subsequent differential consequences for affective state. Importantly, the emphasis in CET is on the functional significance, that it, how one experiences or interprets specific events rather than their nature per se. In the context of self-talk, it is proposed that how one interprets self-talk (i.e., whether the functional significance is informational or controlling) is considered to be independent of content. For example, the phrase "concentrate" may be experienced as pressurising and commanding, or as supportive and encouraging.

Thus, the overall aim of this study was to examine associations between informational and controlling self-talk, and post-lecture affect. Specifically, the purpose was twofold: first to determine whether informational and controlling selftalk could be empirically differentiated by developing a measure of the two interpretations of self-talk, and second to examine whether informational and controlling self-talk were associated with different post-lecture affective states. Drawing on Deci and Ryan's (1985) description of informational and controlling events, it was proposed that informational self-talk would emphasise the individuals' own perspective, highlight opportunities for self-initiation and choice, present a meaningful rationale if choice is constrained, avoid the use of pressures and contingencies to motivate behaviour, and provide positive feedback (Vansteenkiste, Lens & Deci, 2006). Conversely, controlling self-talk would be characterised by pressures to act, think or feel a certain way and reflect a perceived lack of choice and control. Thus, to reiterate, it is how one experiences self-talk (i.e., whether the functional significance is informational or controlling), rather than the content, which is theorised to influence affective state. It was hypothesised that informational selftalk would be positively related to positive affect and negatively associated with negative affect and state anxiety. On the other hand, controlling self-talk would be

positively associated with negative affect and state anxiety but negatively correlated with positive affect.

In addition to hypothesising direct associations between self-talk and affect, it was proposed that controlling and informational forms of self-talk might exacerbate and attenuate, respectively, the association between an unpleasant or stressful experience and students' affect and anxiety. The stress-buffering hypothesis (e.g., Cohen & Wills, 1985) proposes that support has greater positive effects when stress is high than when stress is low and conversely, the absence of support has a greater detrimental effect when stress is high than when stress is low. This is due to the increased likelihood that individuals will require and respond positively to additional resources or assistance under conditions of greater strain. Research examining interactions between stress and social support has confirmed a moderating effect for support (e.g., Melamed, Kushnir, & Meir, 1991). Furthermore, research within a higher education setting has shown that both interpersonal support and intrapersonal factors such as the use of adaptive coping styles buffer the effects of high levels of stress on anxious and depressive symptoms (Crockett et al., 2007). On the basis that self-talk could be considered a form of self-administered support, it was expected that informational self-talk would have a greater influence upon affect when individuals experienced the situation as more demanding; in this case, when students reported a poor understanding of material covered during a lecture, or a negative experience of the lecture. Furthermore, it was predicted that the negative influence of controlling self-talk would be more evident when students reported either a negative experience or a poor level of understanding.

Method

Participants

Participants were 146 undergraduate students (83 males, 49 females, 14 unreported) with a mean age of 19.25 (SD = 2.57). All students were based within a Sport Science department, and were enrolled on first or second year research methods/statistics modules. These modules were targeted as they form a compulsory element of these undergraduates' courses, which students must pass in order to progress. To ensure voluntary participation, no course credit was given for taking part, and the researcher collecting data was not involved in the teaching or assessment of that module. Approximately half of the students enrolled on the courses elected to participate.

Measures

Self-talk. A set of 17 items were generated to assess controlling and informational self-talk. The items were developed and refined through discussion with peers, all of whom have previously published work on self-determination theory, including one expert in self-determination theory and measurement issues, and one expert in self-talk. In addition, item content was based on those used in previous literature examining autonomy-supportive or controlling communications, with modifications to make them applicable to self-verbalizations (e.g., Deci, Driver, Hotchkiss, Robbins, & Wilson, 1993). According to CET it is the relative salience of the aspects of events to an individual that determines their functional significance. Thus the same event could have a different functional significance for different people. Therefore, drawing on traditional methodologies of personality paradigms which seek to understand individuals in their own terms (King & Napa, 1998), we developed a self talk measure that enabled students to report a potentially limitless range of self-talk, rather than imposing experimenter-generated statements, and then to rate their self-talk as either informational or controlling. Similar to research examining self-generated goals (e.g., Sheldon & Kasser, 1998; Little, 1989), in which participants record their personalised examples or stems and then rate these on variables of interest, students were asked to report the three most frequent self-talk statements they said (aloud or silently) to themselves during the lecture. They then completed the set of 17 items in response to each self-talk statement. For example, a student might report that they said to themselves the word "Concentrate". Items required the student to rate the extent to which that self-talk "made me feel I had no control over the situation" or "reassured me that I was in control". These example items reflect controlling and informational self-talk, respectively. Items were scored on a five point Likert scale from 1 (not at all) to 5 (very much so). Overall informational and controlling self-talk scores comprised the mean of the respective responses to the three self-generated statements.

Positive and Negative Affect. The 10-item International Positive and Negative Affect Scale Short Form (I-PANAS-SF; Thompson, 2007) was employed to measure positive and negative affect. This questionnaire consists of two subscales, Positive Affect and Negative Affect, which in line with Watson, Clark, and Tellegen's (1988) conceptualisation were considered to be independent dimensions of affect. Participants were asked to rate how they felt 'right now' on five point Likert-type scales from 1 (not at all) to 5 (very much so). Items included "alert" (positive affect) and "hostile" (negative affect). Subscale scores were created by summing relevant item ratings. The IPANAS-SF has been found to be a reliable, valid and efficient tool for measuring affect (Thompson, 2007). In the present investigation, Cronbach's alphas were .87 for positive affect and.89 for negative affect.

State Anxiety. State Anxiety was measured using Marteau and Bekker's (1992) six item short-form version of the state scale of Spielberger's (1983) State-Trait Anxiety Inventory (STAI-Y6). Marteau and Bekker reported acceptable reliability among individuals manifesting a range of anxiety levels. Participants were asked to indicate how they felt 'right now, at this moment' on items including "I feel calm" and "I feel worried". Items were rated on a four-point Likert-type scale from 1 (not at all) to 4 (very much), with a state anxiety score formed by summing the item ratings. Cronbach's alpha was .76 in the present sample.

Lecture Experience and Understanding. Two single item measures assessed students' confidence in their understanding of the lecture material and their overall experience (positive or negative) of the lecture. Understanding was scored on a 7-point scale ranging from 1 (not at all confident) to 7 (very confident). Overall experience of the lecture was rated on a 7-point scale from –3 (very negative) to +3 (very positive), with 0 representing neutral.

Procedure and Data Analysis

Prior to informed consent being obtained, participants were informed that the purpose of the study was to examine links between self-talk and affect. Students completed the battery of questionnaires immediately after one research methods lecture. Due to the novel structure of the self-talk questionnaire, prior to hypothesis testing a principal components analysis was conducted in order to refine the measure and ascertain its structural integrity.

Moderated hierarchical regression analysis was used to test whether the two types of self-talk had differential main effects on affect and anxiety and whether they moderated the influences of experience and understanding of the lecture on the state affect variables. This was conducted in the manner recommended by Jaccard, Turisi,

and Wan (1990), and has been widely used in previous research (e.g., Standage, Treasure, Hooper & Kuczka, 2007). The independent variables were standardised prior to computing the product terms, and the unstandardised regression coefficients were examined to interpret the form of the interaction. All hypotheses were tested against a significance level of p < .05.

Results

Self-talk questionnaire

When attempting to determine whether informational and controlling self-talk could be empirically differentiated, examination of the statements and ratings provided by participants provided some support for this. Participants reported statements relating to a range of topics, including the lecture content (e.g., "what do I need to know?": "I've covered this before"), general encouragement (e.g., "come on don't get left behind again"), instructions (e.g., "make notes"), current feelings (e.g., "I'm hungry"), and irrelevant statements (e.g., "I'll go to the gym tonight"). The broad range of self-talk reported provides additional justification for using a personalised approach rather than generic item stems. From examining the content of statements and ratings both within and between participants, it was noted that there was a tendency for some types of statement to be rated in a particular way. However, this was by no means universal. This is constant with Deci and Ryan's original theorising, in that certain events might be expected to have an "average functional significance" across groups of people. For example, an event might be informational, controlling, or amotivational on the basis of the average effect it has on a group of people. However, they state that an event, in this case a self-talk statement, can only be properly labelled with respect to its effect on an individual at a given time.

Principal Components Analysis

To further refine the self-talk measure, principal components analyses (PCAs) were conducted on the self-talk items to distinguish between the informational and controlling loading items. Three separate PCAs were conducted, with each administration of the item set treated as a separate sample. Within each of the three PCAs, we aimed to identify the best indicators of informational and controlling self-talk through the elimination of cross loading and/or low loading items. This then allowed us to also identify the most consistent indicators of informational and controlling self-talk across the three statements provided, which were subsequently employed in our main analyses. Although we are not aware of any research directly advocating this strategy, previous researchers have conducted multiple factor analyses on the same item set when completed by different assessors for similar reasons to those in the present investigation (e.g., Achenbach, Dumenci, & Rescorla, 2003).

For statement 1, a principal components analysis with promax rotation, using a forced two factor solution highlighted two factors with eigenvalues greater than 1.0 which accounted for 44.5% of the variance. The correlation between the two factors was .048. For statement 2, the two factors explained 46.8% of the variance, and an inter-factor correlation of .001 was found. For statement 3, 46.8% of the variance was accounted for, and the correlation between the two factors was .136. Table 1 shows the items and factor loadings for each analysis. Examination of item content revealed that across all three analyses, the first factor contained items intended to tap informational types of self-talk, whereas the second factor contained those items intended to tap controlling self-talk. Thus, factor 1 was labelled informational self-talk and factor 2 was labelled controlling self-talk. The correlations between the two factors in all three cases were not significantly greater than zero. Given this, and the

conceptual and empirical distinction between items, it was decided that the two factors represented independent constructs in the manner expected. The conditions for item retention were that an item loaded on its intended factor at or above a threshold of .3 in at least two analyses, and approached this threshold in the third analysis, and that it did not load on its unintended factor above .3 in more than one analysis. This threshold has been advocated by previous researchers (e.g., Tabachnick & Fidell, 2001). Items 1, 3, 5, 7, 13, 15 and 17 were retained for the informational self-talk factors. Items retained for the controlling self-talk factor were 2, 4, 8, and 14. Items that did not load clearly on their intended factors tended to be those that were more complex, either linguistically or semantically (e.g., "allowed me to better understand what I need to do"; "directed me to think or feel a certain way"). Informational and controlling self-talk scores for hypotheses testing were comprised from means of the respective responses to the three self-generated statements.

Table1

	Statement 1		Statem	ent 2	Statement 3		
	Factor	1 Factor 2	Factor	1 Factor 2	Factor	1 Factor 2	
1. Made me feel I was in control	.843	025	.800	171	.837	142	
3. Was self-encouraging	.812	132	.769	125	.774	086	
5. Made me feel more in charge	.774	101	.809	027	.813	.025	
7. Assisted my understanding	.290	.009	.720	.127	.710	.176	
9. Allowed me to better understand	570	096	607	227	125	257	
what I needed to do	.572	.080	.087	.237	.425	.557	
11. Acknowledged how I was	.118	.604	.222	.051	.144	.341	

Principal components analysis of self-talk items: promax rotated factor loadings.

feeling

.753	019	.725	075	.816	127
676	160	666	- 104	717	001
.070	.109	.000	.171	./1/	.001
077		015	052	015	028
.033	080	.015	055	.045	028
.035	.675	200	.687	173	.586
147	.693	148	.722	127	.635
188	604	301	345	310	432
.100	.004	.501	.5 15	.510	.152
.143	.490	.047	.487	104	.677
.444	.338	.384	.611	.041	.722
343 ,	.250	.528	.471	.028	.491
283	673	406	544	- 271	474
203	.075	400	.544	271	.4/4
.659	.130	.405	.275	.241	.642
	.753 .676 .833 .035 147 .188 .143 .444 g .343 283 .659	.753019.676.169.833080.035.675147.693.188.604.143.490.444.338.343.250283.673.659.130	.753019.725.676.169.666.833080.815.035.675200147.693148.188.604.301.143.490.047.444.338.384.343.250.528283.673406.659.130.405	.753019.725075.676.169.666194.833080.815053.035.675200.687147.693148.722.188.604.301.345.143.490.047.487.444.338.384.611.343.250.528.471283.673406.544.659.130.405.275	.753019.725075.816.676.169.666194.717.833080.815053.845.035.675200.687173.147.693148.722127.188.604.301.345.310.143.490.047.487104.444.338.384.611.041.343.250.528.471.028283.673406.544271.659.130.405.275.241

Descriptive statistics

Table 2 shows the means, standard deviations and bivariate correlations between the variables of interest. Experience and understanding of the lecture were both significantly positively correlated with positive affect, and significantly negatively associated with state anxiety and negative affect. Informational self-talk showed a significant moderate positive correlation with positive affect. Controlling self-talk was significantly positively correlated with negative affect and state anxiety.

Table 2.

Means, standard deviations and intercorrelations among the variables.

		Mean	SD	1	2	3	4	5	6	7
1	Experience of Lecture	1.01	1.21							
2	Understanding of Lecture	4.56	1.34	.317**						
3	Informational Self-Talk	2.83	.71	.349**	.132					
4	Controlling Self-Talk	2.49	.63	088	140	.132				
5	Positive Affect	14.90	3.99	.380**	.194*	.373**	.129			
6	Negative Affect	8.09	3.67	179*	289**	086	.379**	.116		
7	State Anxiety	11.11	3.37	246**	340**	092	.282**	121	.729**	

• *p* < .05; ** *p* < .01.

Hypothesis Testing

Results of the moderated hierarchical regression analyses are shown in Table 3. Prior analysis of casewise diagnostics and Mahalanobis distances revealed no univariate or multivariate outliers.

Positive Affect. Both lecture experience and understanding significantly predicted positive affect in all four regression analyses. Informational self-talk explained 6.4% and 12.4% of variance in positive affect over and above the effects of lecture experience and understanding respectively. Controlling self-talk explained 2.8% and 2.6% of variance in positive affect over and above the effects of lecture experience and understanding respectively, although examination of the beta coefficients revealed that these were in the opposite direction to that hypothesised. However, none of the interaction terms were significant.

Table 3

Summary of regression statistics concerning the relationship between Lecture Experience, Understanding, and use of Self-Talk upon Affective Variables:

DV	Independent	R ² .	ΛR^2 .	Fuo:	Beta:	p(b):
DV.	Variable:	κ.	Δις .	* (di)•	Boun	P(0).
Positive affect	Lecture Experience	.153	.153*	12.04 (3,120)	.309	.000
	Informational self-talk	.218	.064*		.171	.002
	Product	.231	.014		.118	.147
Positive affect	Lecture Understanding	.036	.036	8.22 (3,120)	.169	.055
	Informational self-talk	.160	.124*	25	.348	.000
	Product	.170	.010		.106	.222
Positive affect	Lecture Experience	.154	.154*	10.51 (3,123)	.405	.000
Chapter 3: Self-talk and post-lecture affect.

	Controlling self-talk	.183	.028*		.163	.046
	Product	.204	.021*		146	.072
Positive affect	Lecture Understanding	.039	.039*	2.88 (3,123)	.222	.013
	Controlling self-talk	.065	.026†		.161	.070
	Product	.066	.000		021	.815
Negative affect	Lecture Experience	.038	.038*	2.00 (3,121)	197	.040
	Informational self-talk	.038	.000		022	.819
	Product	.047	.009		097	.281
Negative affect	Lecture Understanding	.055	.055*	2.54 (3,121)	236	.012
	Informational self-talk	.058	.003		054	.549
	Product	.059	.001		031	.735
Negative affect	Lecture Experience	.029	$.029^{\dagger}$	10.07 (3,124)	140	.086
	Controlling self-talk	.164	.135*		.362	.000
	Product	.196	.032*		179	.028
Negative affect	Lecture Understanding	.065	.065*	10.70 (3,124)	193	.019
	Controlling self-talk	.187	.123*		.342	.000
	Product	.206	.018†		136	.095
State Anxiety	Lecture Experience	.068	.068*	3.36 (3,121)	270	.005
	Informational self-talk	.068	.000		001	.987
	Product	.077	.009		096	.277
State Anxiety	Lecture Understanding	.099	.099*	4.80 (3,121)	329	.000
	Informational self-talk	.102	.002		045	.606
	Product	.106	.005		072	.421
State Anxiety	Lecture Experience	.063	.063*	8.19 (3,124)	231	.006
	Controlling self-talk	.130	.068*		.254	.003
	Product	.165	.035*		187	.025

Chapter 3: Self-talk and post-lecture affect.

State Anxiety	Lecture Understanding	.104	.104*	10.06 (3,124)272	.001
	Controlling self-talk	.162	.058*	.226	.006
	Product	.196	.034*	185	.025
	1				

* Indicates value significant at $p \le 0.05$; [†] indicates value approaching significance.

Negative Affect. Lecture experience and understanding were significantly negatively related to negative affect in all four regressions. Although informational self-talk did not explain any additional variance, controlling self-talk explained 13.5% and 12.3% of the variance in negative affect over and above the effects of lecture experience and understanding respectively. In addition, there was a significant interaction between lecture experience and controlling self-talk (p < .05). Figure 1 shows the form of this interaction plotted using the regression estimation equation formed from the unstandardised coefficients, in the manner recommended by Jaccard et al. (1990). Plot points were calculated for hypothetical participants scoring one standard deviation above the mean, at the mean, and one standard deviation below the mean (labelled high, mean and low respectively) on each of the predictor variables, as recommended by Cohen and Cohen (1983). Figure 1 indicates that increases in negative affect associated with a negative experience of the lecture only occur when mean or high levels of controlling self-talk are present, whereas when students reported a positive experience use of controlling self-talk had no effect.

Following the procedure described by Aiken and West (1991), for each interaction simple slopes of the regression lines were computed to identify whether the slopes differed significantly from zero. For the regression of negative affect on lecture experience, there was a significant negative regression at high levels of controlling self-talk, $t_{(124)} = -2.782$, p < .01. The regression at low levels of controlling

self-talk did not differ from zero, $t_{(124)} = .473$, p = .637. The regression at the mean level of controlling self-talk was negative but nonsignificant, $t_{(124)} = 1.692$, p = .093. *Figure 1*

Interaction of Lecture Experience and Controlling Self-talk predicting Negative Affect.



State Anxiety. Lecture experience and understanding were significantly negatively related to state anxiety in all four regressions. However, informational selftalk did not explain any additional variance. Conversely, controlling self-talk explained 6.8% and 5.8% of the variance in state anxiety over and above the effects of lecture experience and understanding, respectively. In addition, two interaction terms explained significant additional variance in state anxiety: lecture experience and controlling self-talk (p < .05), and lecture understanding and controlling self-talk (p < .05). These two interactions were plotted in Figures 2 and 3. Figure 2 indicates that increases in state anxiety associated with a negative experience of the lecture only occurred when mean or high levels of controlling self-talk were present, whereas when students reported a positive lecture experience, use of controlling self-talk had

no effect. Simple slopes analyses showed that for the regression of state anxiety on lecture experience, the negative regression lines at mean and high levels of controlling self-talk were significant ($t_{(124)} = -2.758$, p < .01; $t_{(124)} = -3.547$, p < .01, respectively). The regression of state anxiety on lecture experience at low levels of controlling self-talk did not differ from zero, $t_{(124)} = .473$, p = .637. Figure 3 indicates that increases in state anxiety associated with a less confident understanding of lecture material only occurred when mean or high levels of controlling self-talk were present, whereas when students reported a positive experience use of controlling self-talk had no effect. For the regression of state anxiety on lecture understanding, simple slopes analysis confirmed significant negative regression lines at mean and high levels of controlling self-talk ($t_{(124)} = -2.758$, p = .< .01; $t_{(124)} = -3.547$, p < .01, respectively). The regression of state anxiety on lecture understanding at low levels of controlling self-talk did not differ from zero, $t_{(124)} = -2.214$, p = .831.

Figure 2

Interaction of Lecture Experience and Controlling Self-talk predicting State Anxiety.



Figure 3

Interaction of Lecture Understanding and Controlling Self-talk predicting State

Anxiety:



Discussion

The primary purpose of this study was to investigate whether the type of selftalk students used during a lecture was associated with their post-lecture affect. Results indicated a positive association between informational self-talk and positive affect that was consistent with the proposed hypothesis. In addition, hierarchical regressions indicated that informational self-talk explained variance in positive affect over and above the effects of both lecture experience and understanding, highlighting the independent contribution of self-talk to affective state even when the effects of specific events are considered. These findings are consistent with Deci and Ryan's (1985) theoretical proposition that informational intrapersonal events, including thoughts and feelings, which foster greater autonomy and enhanced perceptions of competence, are related to greater well-being. The results are also aligned with empirical studies highlighting the benefits of both externally and internally provided positive informational feedback (e.g., Zhou, 1998; Ryan, 1982).

The findings pertinent to controlling self-talk, negative affect and state anxiety were also consistent with our a priori hypotheses. Controlling self-talk was moderately and positively correlated with negative affect and state anxiety; explaining additional variance in both variables over and above lecture experience and understanding. Negative feedback has previously been shown to increase negative affect to a greater extent than it decreases positive affect (Ilies, De Pater & Judge, 2007), perhaps explaining the lack of a significant correlation between controlling self-talk and positive affect in the present study.

It is worth noting that findings of nonsignificant associations between informational self-talk and negative affect and state anxiety might imply that although the presence of informational self-talk is associated with beneficial outcomes (e.g., elevated positive affect), its absence is not necessarily associated with poorer affective states. This provides some support for the notion that informational and controlling aspects of an event constitute two distinct factors, and that the absence of an informational interpretation does not necessarily mean that an event is interpreted as controlling. Therefore, although informational events can support autonomy and competence, a lack of informational support does not necessarily thwart need satisfaction. Additionally, controlling self-talk predicted significant additional variance in positive affect over and above that explained by lecture experience and understanding and this association was positive. It is unclear why controlling self-talk should have a positive association with positive affect, particularly given that, as expected, it was significantly related to higher anxiety and negative affect. It is possible that controlling self-talk had a positive effect on the types of feeling states

tapped by the positive affect subscale of the PANAS, specifically "alert, inspired, attentive, active, and determined". These words seem to reflect the activation (i.e., low to high arousal) dimension of the circumplex model of affect as opposed to the valence (i.e., positive to negative) dimension (Russell, 1980). It is plausible that affective arousal could be positively linked to controlling self-talk, with arousal enhanced by self-talk which makes participants feel they should or have to do something. However, caution should be expressed when considering this explanation, particularly given the nonsignificant zero-order correlation between controlling selftalk and positive affect. Further investigation of links between types of self-talk and affect which delineates between arousal and valence dimensions is warranted.

With regard to proposed interactive effects, in opposition to our hypotheses there were no interactions involving informational self-talk; using informational selftalk was correlated with more positive mood states regardless of individuals' experiences or level of understanding. This implies that informational self-talk may be beneficial regardless of situational experience. It is possible therefore that informational self-talk operates in a different manner to typical support-type variables (e.g., social support), which would be expected to have greater benefits when challenge or stress appraisals are high (e.g., Melamed et al., 1991).

For controlling self-talk, three significant interactions emerged which indicated that higher levels of negative affective states associated with a negative experience or poor understanding of a lecture only occurred when mean or high levels of controlling self-talk were present. However, it can be seen from the figures that there was little difference in negative affect or state anxiety at high levels of understanding or experience, irrespective of the level of controlling self-talk used. Although speculative, it is possible, that when having a negative experience,

controlling self-talk could reinforce students' low perceptions of competence and autonomy, thereby increasing negative affect and anxiety. This is somewhat aligned with literature examining goal setting which has found that controlling goals are negatively related to long-term goal commitment, attainment, and well-being (e.g., Sheldon & Kasser, 1998), as they inhibit personal choice, and undermine perceptions of autonomy. Furthermore a perceived lack of control over situations has been consistently linked to negative affect (e.g., Ferguson, Daniels, & Jones, 2006).

It is less clear why higher levels of controlling self-talk were not associated with more negative affective states when students reported high levels of understanding or a positive experience. It could be that the negative influence of controlling self-talk is rendered less influential by environmental factors that support feelings of competence. That is, if students feel capable or are having a good experience, controlling or critical self-talk might not undermine competence, which in turn does not decrease well-being. This proposition gains some support from research investigating the relative potency of self-efficacy sources, which has identified strongest effects for mastery experiences over other sources including verbal persuasion (Bandura, 1997). More specifically, in some studies, having controlled for mastery experience, the effects of other sources become nonsignificant (e.g., Lopez & Lent, 1992).

Given the emergence of significant interactions, it is worth noting that previous researchers have argued that field researchers tend to report considerable difficulty in finding theorised moderator effects (McClelland & Judd, 1993), and that those explaining as little as 1% of total variance should be considered important (Evans, 1985). Consequently, it should be highlighted that in the present study each significant interaction explained at least 3.2% of additional variance. Furthermore, all

three interactions were of a similar form, which were consistent with the a priori hypotheses. These theoretically derived and empirically supported predictions lend some supportive evidence for the measure of self-talk employed in the present study. Although individuals' interpretation of their self-talk has been examined previously (e.g., Hardy, Hall, & Alexander, 2001), to the best of the author's knowledge, the selftalk questionnaire utilized in the current investigation is the first multiple item and theoretically driven measure of the interpretation of self-talk. This questionnaire draws upon the functional significance concept from SDT which is itself a relatively under-examined, yet important, aspect of this theory. As a result, the present investigation has identified an avenue that might glean better understanding of the functional significance of events.

However, there are limitations that should be taken into consideration when interpreting the findings of the present study. The cross-sectional nature of the design means that causality can only be inferred and not assumed. For example, it might be that it is affective state that triggers the use of different types of self-talk rather than the reverse. Indeed, cognitive researchers have in the past stated that cognition and emotion are best conceptualised as interdependent, over-lapping constructs (e.g., Meichenbaum & Butler, 1979). In the present study items were phrased to reflect sequential time-points, in that participants were asked to recall self-talk used during the lecture, and then to report their post-lecture affective state "right now, at the moment", in order to reduce the possibility of measuring self-talk caused by participants' affective states.

An additional caveat concerns the relative homogeneity of the sample. The sampling of undergraduate students has obvious implications concerning a limited age range and educational background. Consequently researchers should exercise caution

and contextual awareness when attempting to generalise the present findings to different populations. For example, it is possible that higher education students may be prone to the utilization of cognitive and problem solving forms of coping, or may use more cognition-based self-regulation; these in turn may have consequences for their use of self-talk.

Despite these limitations, the findings of the present investigation have implications for both theory and practice. From a theoretical perspective, these results support Deci and Ryan's (1985) proposition that in addition to socio-environmental events, intrapersonal factors, specifically in this case self-talk, are associated with changes in one's affective state. However, according to CET the effects of controlling and informational events on affect and well-being are mediated by psychological need satisfaction. Due to our focus on the potential affective outcomes of self-talk per se and on its interaction with students' experience of the lectures, need satisfaction was not measured in the present investigation. Future research should explicitly examine the mediating role of need satisfaction in the self-talk-affect relationship and in particular, moderated mediation models, to more clearly understand how the variables of interest relate to one another. In addition, given that the interpretation of self-talk seems to be related to affect, and could be argued to be potentially important in terms of long-term well-being, further investigation into the antecedents of different types of self-talk (e.g., lecturing style) is warranted.

From an applied perspective, the finding that informational self-talk was correlated with emotional state regardless of situational experience suggests that its use should be promoted in higher education. In addition, when encouraging students to use self-talk it is important that these statements are self-endorsed, emphasise students' autonomy, and increase perceptions of competence. Furthermore, students

should be discouraged from using self-talk that is controlling in nature, especially during a negative experience. It is proposed that training students in the use of selftalk may enable more effective coping with stressful events, potentially improving post-lecture affect and ultimately students' experience of higher education.

CHAPTER 4.

IDENTIFYING IMPORTANT PRACTCE BEHAVIOURS FOR THE DEVELOPMENT OF HIGH-LEVEL YOUTH ATHLETES: EXPLORING THE PERSPECTIVES OF ELITE COACHES.

This chapter is in press at Psychology of Sport and Exercise as:

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This research was presented at the 6th All Wales Sport, Exercise Science and Medicine Conference, Aberystwyth, UK, June 2009.

Chapter 4: Identifying important training behaviours.

The importance of training is highlighted by evidence showing that at least ten years of preparation, or 10,000 hours of training, are required to reach expert performance levels (Ericsson & Charness, 1994), and that for the majority of sports time spent training considerably outweighs time spent competing (e.g., see McCann, 1995). Research examining the quality and quantity of training has indicated that both elements are crucial predictors of attainment (Baker, Horton, Robertson-Wilson, & Wall, 2003). However, given the proportion of time athletes spend training, there is a lack of research studying athletes' behaviours within the non-competitive environment. This lack of research is perhaps due to an applied priority of maximising athletes' performance in competition, rather than in practice. In light of the importance of training for athlete development and performance attainment (Galton, 1979), in the present study coaches' perceptions of effective athlete behaviours within this context were investigated.

Thus far, psychological research examining training of athletes has been relatively restricted in its scope. Contrary to the proposition of Galton (1979), who argued that performance increases monotonically as a function of practice, Ericsson, Krampe, and Tesch- Römer (1993) suggested that the quality of training is also important, and that elements such as well-defined tasks at an appropriate difficulty level, informative feedback, and opportunities for repetition and error correction all lead to enhanced progression. As such, researchers within the sporting domain have attempted to differentiate between functional and maladaptive training strategies, and to identify training types and structures that maximally enhance skill learning and development (e.g., Holliday et al., 2008). However, it has been noted that the extensive and repetitive deliberate practice required by elite performers is not necessarily inherently motivating, requires high levels of effort and attention, and

does not lead to immediate social or monetary reward (Ericsson et al., 1993). Consequently, researchers have identified strategies aimed at enhancing interest and motivation during training. For example, Green-Demers, Pelletier, Stewart, and Gushue (1998) found that creating challenges, adding variety to the task, providing self-relevant rationales for task performance, and exploiting stimulation from sources other than the task itself, were associated with enhanced interest during training, and with more adaptive forms of motivation.

It is plausible that within the training environment, athletes may present a variety of behaviours that reflect their differing levels of motivation. For example, they may be enthusiastic, encourage teammates, and consistently try their hardest; conversely, they may be disengaged, fail to fully concentrate on instructions, and put only minimal effort into drills or exercises. In addition, it is possible that changes in both internal (e.g., mood) and external factors (e.g., coach behaviours) may result in intrapersonal variation in practice behaviours from session to session. This latter hypothesis is somewhat aligned with changes in follower engagement, behaviour, and performance observed as a result of changes in leader behaviour in an organisational setting (e.g., Barling, Webber, & Kelloway, 1996).

Research examining engagement suggests that those high in engagement invest large amounts of visible attention and muscular effort (Goffman, 1961). Additional behaviours associated with engagement include organisational citizenship behaviours such as prosocial behaviours, helping others, innovation, and volunteering (Turnipseed & Rassuli, 2005). Drawing from this literature, Lonsdale, Hodge, and Raedeke (2007) interviewed fifteen athletes regarding their perceptions of athlete engagement. Lonsdale et al. concluded that athlete engagement could be defined as a persistent, positive cognitive-affective experience in sport characterised

predominantly by confidence, dedication, and vigour. In later measurement development, Lonsdale, Hodge, and Jackson (2007) found that a four-factor model including confidence, dedication, vigour, and enthusiasm was the best fit to their data. In line with the organisational literature, Lonsdale et al.'s conceptualisation focuses on the cognitions and affective elements of athletes' experiences of their sport. It is likely that in sport, as in business, engagement may be a precursor to adaptive behaviours. For example, dedication, defined by Lonsdale et al. as "a *desire* to invest effort and time towards achieving goals one views as important" (p.472; emphasis added) is likely to precede actual investment of effort in practice. Equally, the presence of vigour, defined as "physical, mental, and emotional energy or liveliness" (p.472), would seem to be important or even necessary for athletes to train most effectively.

The majority of previous research has tended to conceptualise training behaviour in terms of attendance or adherence to sessions or workouts (e.g., Palmer, Burwitz, Smith, & Collins, 1999), as performance on specific skills (e.g., football scrimmaging; Smith & Ward, 2006), or as the volume of work completed (e.g., Tharion, Harman, Kraemer, & Rauch, 1991). Some studies have attempted to differentiate between the types of behaviours exhibited by athletes during practice sessions. For example, Young and Starkes (2006a) presented a series of studies which examined behaviours coaches felt were indicative of swimmers' self-regulation during training. They identified a list of seven non-regulated training habits, and conversely, corresponding but semantically opposite behaviours were identified as representing effective self-regulation (e.g., 'perfect attendance' corresponded with 'does not attend all practices'). In a follow-up study, Young and Starkes (2006b) reported that coaches' ratings of swimmers' behaviours were associated with actual behaviour, in

that swimmers who were rated low in self-regulation completed less of the prescribed swim volumes.

The checklist developed by Young and Starkes (2006a) could prove useful to swim coaches when seeking to identify swimmers who may be able to train more effectively. However, the behaviours highlighted are specific to swimming. Hence it is unclear whether the types of behaviours identified (e.g., inaccurate recall of pace times) may be applicable to other sports, and critically, whether the behaviours identified are actually perceived as important by the coaches in terms of their athletes' progression. In addition, by focusing specifically on behaviours symptomatic of active or absent self-regulation, other important athlete behaviours evident during training may not have been considered (e.g., athletes' responses to criticism during the session).

Previous research has also examined individual characteristics or traits and environmental influences that are related to the progression of youth athletes. In a qualitative study of academy football players, Holt and Dunn (2004) reported that commitment, resilience (confidence and coping), discipline, and social support were perceived by youth players and coaches as important determinants of elite players' development. Holt and Dunn reported some specific behavioural subcategories of the main psychosocial competencies, including obeying orders, and reacting appropriately to mistakes. More recently, Harwood (2008) reported the findings of an intervention study targeting coaches' efficacy for enhancing football players' psychological and interpersonal skills in training. The skills targeted were the '5Cs' designated as desirable skills – commitment, communication, concentration, control, and confidence. Harwood highlighted three behaviours associated with each of the five targeted skills, including elevated levels of effort (commitment), asking questions of a

Chapter 4: Identifying important training behaviours.

coach (communication), listening attentively to instructions (concentration), maintaining positive body language (control), and having a presence during training that exudes confidence (confidence). Harwood suggests that the development of these interpersonal, intrapersonal, self-regulatory, and esteem-based competencies is likely to assist player development. However, it is unclear how universally applicable these skills are across youth sports. Clarifying which training behaviours are symptomatic of developed psychosocial competencies, and subsequently also linked to progression, may have important implications for monitoring and targeting interventions with athletes.

Taken together, previous studies suggest that a number of attributes and training behaviours are considered important by coaches, and that in turn these may be linked to important outcomes including performance. However, these findings lack breadth due to the limited number of variables previously examined. In addition, the use of homogenous samples with respect to sport type has precluded the integration and comparison of findings from a wider range of sports. From a theoretical perspective, exploring desirable practice behaviours may identify consequences of athletes' engagement or motivation which have yet to be examined.

Given limited previous study, and a lack of consensus within the literature regarding which specific training behaviours are important for athlete development, the main purpose of the present study was to examine in depth training behaviours perceived to be important by coaches from team sports. That is, behaviours considered either beneficial or detrimental to athletes' progression, in that their presence or absence will impact upon progression. It is worth noting that the present study focused on the perceptions of individuals sharing a common role or background (i.e., they were all coaches). This approach follows the concept of Foucauldian

discourse (Foucault, 1972), in that the conversations held by such groups are likely to not only reflect the ideas of those present, but are in themselves "practices that systematically form the objects [and subjects] of which they speak" (p.49). From this perspective, the discourse of coaches may reveal ways in which the training environment, and athletes' subsequent behaviours are actively shaped and influenced.

As the intention of the study was to focus on identifying training behaviours that were perceived as important for athlete development, coaches of youth athletes were sampled. It was felt that athletes at this stage of their career could be classified as still developing (in the sports selected), whereas senior athletes might not be. It was anticipated that clearer differentiation of important training behaviours would enable both researchers and consultants to gain a more refined understanding of effective training behaviours and, importantly, allow the development and implementation of targeted interventions.

Method

Participants

Participants in the present investigation were 30 male high-level coaches currently working in the United Kingdom ($M_{age} = 36.55$, SD = 8.99). High-level coaches were sampled as it was felt they would possess sufficient knowledge and experience on which to base their perceptions of important behaviours. In order to be classed as high-level, coaches had to be currently coaching at or above the level of a professional club, regional development squad, or for a team currently competing in the highest national relevant age group division for that sport. Participants were currently involved in coaching team sports including rugby union (n = 6), football (n = 12), and rugby league (n = 12), for athletes under the age of 18, and were recruited via email and telephone requests. Participants currently worked at professional clubs (n = 21), regional (n = 6), and international (n = 3) levels, and coached predominantly male teams (76.6%); however, some coached females (3.3%), mixed teams (10%), or both males and females separately (10%). The coaches sampled had an average of 9.37 years coaching experience (*SD* = 5.55), and had spent on average 35.55 months (*SD* = 32.14) with their current teams.

Data Collection Techniques

Data were collected through a series of four focus group interviews. It was felt that focus groups rather than one-on-one interviews would provide more in-depth discussion of the topic, and allow participants to debate various personal preferences to produce some form of consensus regarding important or desired behaviours. Each focus group was lead by a moderator and an assistant moderator, who both held recognised coaching qualifications and had experience coaching recreational and lower level club junior teams. This background knowledge may have enhanced their ability to interact with participants, obtaining a deeper level of understanding and more easily facilitating discussion than would have been possible with researchers unfamiliar with the process and demands of training youth athletes. In order to reduce the possibility of these prior experiences biasing the direction and focus of the group interviews, an interview guide was developed prior to conducting the focus groups, with input and feedback from additional researchers. In line with the recommendations of Morgan and Krueger (1998), and in a similar fashion to Bloom, Stevens, and Wickwire (2003), the pre-determined semi-structured interview guide was followed for each focus group. As far as possible the moderators adopted a noninterventionist stance during the sessions, allowing coaches to direct the discussion themselves. Both moderators had previous experience conducting qualitative research in exercise and sport contexts. To augment their qualitative experience, a number of

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key texts and studies regarding theoretical and methodological approaches were studied prior to designing the present study (e.g., Denzin & Lincoln, 2000) supplemented by discussion with suitably experienced peers. Prior to conducting the main focus groups, a pilot focus group interview was held using five university-level coaches. This was in order to test the efficacy and relevance of the interview guide, to highlight any ambiguous or unclear questions, and to identify any topics or questions that coaches felt were important and might have been missed.

Based on the aims of the study and the pilot interview, a final interview guide was developed which consisted of six sections (see Appendix F for the interview guide). The first of these were opening questions, which required participants to introduce themselves, and to talk about their coaching background. The second section included questions in which coaches were asked to briefly describe what a typical training session involved for them. The aim of these questions was to focus coaches' attention on their own training sessions in order to enhance their recall of athlete behaviours in such contexts. Asking questions about the details of situations has been shown to enhance the accuracy of the reporting of behaviours (e.g., Menon, 1997).

Following opening and focusing questions, transition questions were used to clarify coaches' understanding of the terminology used (e.g., when you hear the term 'training behaviours', what comes to mind?), and to lead into the key questions. In the present study, three key questions were asked. The first, 'how do you like your athletes to behave during training?' was designed to elicit both positive and negative behaviours that coaches either desired or did not like during their sessions. The second key question, 'what behaviours and/or attributes do you think are necessary for an athlete to train effectively?' was designed to focus on training behaviours that

might be more or less important in terms of athlete development. It was of interest to find out, for example, whether coaches felt that an athlete who frequently lost concentration during a session would be impeded in his/her development. For the final key question, a list of behaviours derived from previous studies (e.g., Harwood, 2008) was handed out to participants. Behaviours generated from the earlier focus groups were added to the list for later groups to enable the development of ideas from session to session, in a similar manner to Hendry, Williams, Markland, Wilkinson, and Maddison (2006). Coaches were told that these were behaviours that other coaches had felt were important, and asked to consider how relevant they felt the behaviours were. Finally, participants were asked to try to form a consensus regarding the top five behaviours they felt were most important. This request was designed to stimulate additional discussion between participants and to clarify the group's position regarding any debatable or controversial behaviours, rather than to allow researchers to derive conclusions regarding the relative importance of different training behaviours.

To bring the session to a conclusion participants were asked whether they felt that the behaviours they mentioned were specific to their own sport or could be generalised more widely (each group was homogenous regarding sport coached). Following discussion of coaches' opinions, the assistant moderator read out a short summary of the focus group, including a list of desired and important behaviours. Coaches were asked whether they felt the summary was an accurate reflection of the discussion, and whether anything had been missed or misinterpreted.

Data Analysis

All four focus groups were digitally audio-recorded and transcribed verbatim, resulting in 106 pages of double-spaced text. A hierarchical content analysis was

conducted to organise the raw data into interpretable and meaningful themes and categories (see Scanlan, Stein, & Ravizza, 1989, for an example). An inductive approach was used, in which themes and categorisations are developed from the data rather than from pre-determined categories or theoretical constraints (e.g., Côté, Salmela, Batia, & Russell, 1993). This process was conducted in the manner described by Patton (2002), with raw themes clustered by internal homogeneity and external heterogeneity.

To ensure familiarity with the data, audio files were listened to and transcripts read several times prior to analysis by the moderator. Relevant quotes, or text units, were extracted from the transcripts to form meaningful units of analysis, resulting in twenty-nine pages of double-spaced text. Text units were then given a label or coding based on their content. Similar units were then clustered based on internal homogeneity and external heterogeneity to identify raw data themes. Finally, the raw data themes were clustered into higher order themes and their internal and external integrity examined. Towards the end of from the analysis of the fourth focus group's data it was felt that theoretical saturation had been reached, as the categorisation of the behaviours and ideas emerging could be fitted into an existing framework developed from previous groups' data (Miles & Hubermann, 1994).

Given previous criticisms of the susceptibility of content analyses to researcher bias (see Biddle, Markland, Gilbourne, Chatzisarantis, & Sparkes, 2001) a number of steps were taken to minimise such effects. First, the assistant moderator was asked to match the lower-order themes into higher order categories. The agreement rate was 84.6%, with a Cohen's kappa of 0.82. Cohen's kappa is used to measure classifiers' accuracy, or the likelihood that agreement is due to chance, and ranges from -1 to 1 (Ben-David, 2008). A score of .82 represents an excellent

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agreement beyond chance (Fleiss, 1981). Any divergence was discussed until consensus was reached. This approach was implemented as it allowed a more thoughtful conceptualisation of the resulting clusters than more nomothetic agreement methods (Hill, Thompson, & Williams, 1997). In addition, an independent person (who had not attended any focus groups nor had any prior knowledge of the study) also completed the matching process to assess whether the higher-order classification was logical and transparent. Seventy one per cent of the lower order themes were correctly matched with their higher order category. Differences emerged between similar higher order themes, such as motivation, committed, and professionalism. These conceptual overlaps are considered in discussion of the themes below.

Member checking was also used, first through the oral summaries given during each session, after which group members could respond regarding the accuracy and completeness of the assistant moderator's synopsis. In addition, two coaches from different focus groups in the original sample were given finalised versions of the content analysis, and asked if it fully encapsulated the topics covered in their respective focus groups, and whether anything was irrelevant or had been missed out. The two coaches were selected from those who had expressed an interest in and a willingness to review the completed analysis framework. Coaches from different sports and different focus groups were purposely sampled to reduce the possibility of potential bias towards the content of one focus group session. Both coaches indicated that they were satisfied with the content analysis. However, one of the coaches felt that although representative, as a stand-alone tool some of the category names might need to be expanded, as someone who had not participated in one of the groups may not fully comprehend what was meant by 'respect', for example. An elaboration and discussion of the categories that emerged is presented below. Quotations are presented

to illustrate the emergent themes, and to allow readers further insight into the data (Sparkes, 1998).

Results and Discussion

Following the content analysis, 34 first level clusters of raw themes were identified which were then grouped into eight general dimensions labelled; (a) professionalism, (b) motivation, (c) coping, (d) committed, (e) effort, (f) seeking information to improve, (g) concentration, and (h) negative behaviours (refer to Figure 1 for a summary of the data analysis). It is worth noting at this point that the dimensions identified included both those that appear to encompass or reflect more latent, intrapersonal dispositions or attributes (e.g., drive to succeed), whereas others are more clearly overtly behavioural, referring to explicit, visible actions (e.g., asks questions). During the focus groups moderators used prompts and directive questions to attempt to retain a focus on observable actions, however, coaches frequently mentioned attributes. The transcripts clearly show that these variables were considered to be highly important predictors of progress. Additionally, when asked as to how they could identify athletes with, for example, a drive to succeed, coaches reported that "sometimes you can just tell", or "you can see it in them [the athletes]". It is possible that in some cases, the behaviours reported may be symptomatic of attributes, for example working hard may be a behavioural consequence of motivation or a professional attitude. However, the data available in the present study are insufficient to substantiate such speculation, especially as these causal links were not highlighted by the coaches. Each higher order category is discussed in turn below. Professionalism.

Coaches discussed six behaviours that were categorised under the dimension of professionalism, defined as an approach to training that demonstrates the

behavioural and moral standards expected of high-level athletes. These behaviours were a correct appearance, arriving prepared, being punctual, being honest, and showing respect for both coaches and teammates. Coaches from all focus groups highlighted the necessity of good organisational skills in their players, of arriving at practice "on time, or even early" and being well prepared with "the correct kit for training" and "looking the part". Time-management was perceived as particularly important for youth athletes when combining the demands of their sport and school work, and in some cases balancing the demands of both regional and club training sessions. One coach noted the following:

"they've got to fit in two or three conditioning sessions during the week and on top of this the best players have to go down to Cardiff once a week to train. At the top it's a huge commitment and it's a very busy time for them as well at an academic level".

In addition, coaches felt that it was important for athletes to behave in both an honest and a respectful manner at training, and to "show a professional attitude and show respect". Although quite abstract constructs, coaches felt that there were a number of ways in which athletes could demonstrate respectfulness or honesty. For example, one coach noted that "it's about respect, I used to get sick of giving letters out to kids, and then they'd be in changing rooms, on the floor, left – and it used to really wind me up". It was stated that respect should be evident towards coaching staff, teammates and club facilities and equipment. Generally, it was felt that athletes who were respectful were more rewarding to coach, and were those who were likely to benefit the most from training sessions. In addition, coaches described how athletes might demonstrate honesty through admitting to errors, with one coach noting that " in the younger age groups they're too quick to say – he missed a tackle",

whereas the better players "put [their] hand up and say – it's my fault I messed up here".

Although it appears self-evident why a respectful and honest athlete would be preferable from a coach's perspective, it is worth noting that coaches felt that possessing these qualities actually contributed to players' progression. This was predominantly because they felt that such athletes were more able to develop effective relationships with coaching staff and teammates, and were subsequently more likely to access coaches' support and knowledge. Alternatively, this perception may be a 'coach fulfilling prophecy' (cf. Horn & Lox, 1993). That is, coaches may not be as forthcoming with their expertise for those they perceive to be less likely to succeed, or less deserving of their efforts, and as a result, this impacts detrimentally on progress. The potential associations between behaving in an honest and respectful manner, and career progression in elite sport, as well as the precise mechanism through which this may occur, require further investigation. The emergence of professionalism may be related to the findings of previous studies which report that discipline and dedication are key competencies for young athletes (e.g., Holt & Dunn, 2004). It is possible that behaving in a professional manner is an outcome of being a disciplined and/or dedicated athlete. This is aligned with the earlier proposition that engagement may be a predictor of positive training behaviours.

Motivation.

The higher order theme, motivation, consisted of five sub-categories including a drive to be the best, a drive to succeed, being competitive, self-motivated, and focused on one's goals. Training attributes grouped within this category were those which referred to an athlete's drive towards or pursuit of a goal. Coaches felt that players who were driven to succeed and to be the best were the most likely to succeed,

and that this attitude was evident in training sessions. For example, coaches referred to players with "inner drive" or "hunger", with one coach describing how a player had "turned round and said, 'look I know now that I've got to be better than my teammates and I've got to do whatever I can to make sure I can be". When categorising the data, a semantic distinction was made between quotes reflecting a desire to succeed in the long-term (i.e., to have a successful career in the sport), as opposed to a current desire to be the best player in the squad, for example. Being competitive in terms of training and progression, as well as during games, was also an important attribute, with one coach reporting that his players "will climb over each other to get them slots [in the team]".

Self-motivation was also highlighted within this dimension as a "vitally important" attribute in elite athletes. Coaches felt that an athlete who was selfmotivated would be more likely to progress as they were interested in learning and developing. One coach described their ideal athlete as somebody "who is quite selfmotivated and who has got the will to learn". Another stated that "there's got to be an inherent self-motivation, they've got to be able to motivate themselves so the onus isn't on the coach". In addition, the need for players to be "single minded" in terms of their goals and ambition within the sport, and "focused on where they want to get to eventually" was frequently advocated by coaches.

Motivation has been previously cited as a key requirement for success in sport by international and Olympic level athletes (e.g., Durand-Bush & Salmela, 2002). Research with collegiate coaches has also shown that athletes who made substantial progress whilst under their supervision were perceived as being competitive, motivated and receptive to coaches' instructions (Giacobbi, Roper, Whitney, & Butryn, 2002), qualities which are similar to those highlighted by the present sample.

Theory-based research has also identified links between the quality of athletes' motivation and their participation in sport. For example, in a longitudinal study, Sarrazin,Vallerand, Guillet, Pelletier, and Cury (2002) reported that athletes with high levels of intrinsic motivation to know, to accomplish, and to experience stimulation, were significantly less likely to drop out of than those with low levels of these selfdetermined motives. In essence, Sarrazin et al. argued that athletes who are engaged in sport for the pleasure inherent in taking part are more likely to continue in their chosen sport. Although not highlighted by coaches in the present study, it would be of interest for future investigations to examine whether those athletes perceived as exhibiting more positive training behaviours were those who possessed more selfdetermined regulations for their sport.

Coaches repeatedly emphasised the perceived importance of competitiveness and its links with development. It is possible that being competitive during training may be linked with athletes' long-term motivation and persistence, as well as progress. For example, McCarthy, Jones, and Clark-Carter (2008) have shown that competitive excitement is positively related to enjoyment in youth sport, and in turn enjoyment has been shown to predict enhanced persistence and decreased withdrawal (e.g., Ommundsen & Vaglum, 1992).

Coping.

Four lower order categories, relating to the way in which players deal with the demands of their sport, were clustered under the theme coping. These were working hard following failure, and having a positive attitude following setbacks (which were grouped under the broader sub-dimension of resilience), as well as responding appropriately to success, and mental strength. Coaches were explicit that they desired players who would display resilience through both a positive attitude, and

behaviourally through working hard following failure or a setback (e.g., not being selected for a squad). Coping was conceived as responding appropriately to a positive or negative experience, rather than just coping with the negative emotions associated with failure. For example, one coach argued that players who are able to "cope with disappointment with losing – I don't think those are the best players, I think the best players are the ones who won't accept it, they absolutely hate it – they will fight to do everything to avoid that situation". The potential impact of resilience on a players' development was highlighted in the following quote in which a football coach discussed the many hurdles or barriers a player may face during their career. He argued that players need to consider:

"how can you cope with hurdles? Can you jump over them or do you stand behind the hurdles? It determines you. If you're able to jump all these hurdles on your way, then you have a chance to become a football player. Otherwise, no way".

Coaches also mentioned the importance of players being able to cope with success, which was perceived as a different skill to being able to cope with setbacks, and focused on a player being able to keep on working hard and not to get distracted by previous achievements. This was summarised as being able to "cope with success and most importantly to remain realistic". The importance of coping with success for continued progression in youth sport has perhaps been somewhat overlooked, with previous research tending to focus on athletes' abilities to cope with negative events such as performance failures, mistakes, setbacks, injuries, and pain (e.g., Nicholls, Holt, Polman, & James, 2005; Buman, Omli, Giacobbi, & Brewer, 2008). For young athletes who experience early success, re-adjusting their goals, maintaining focus and commitment, and potentially dealing with the media and interest from professional

clubs may be problematic. Recognition of the potential for success to interfere with development, the provision of relevant support following success, and training athletes in effective coping skills might assist in minimising any negative effects of success.

Finally, as well as being able to cope with certain situations, coaches felt that it was important that players possessed mental toughness or mental strength. When asked to elaborate on what precisely they meant by this quality, coaches described this as a general attribute that enabled players to respond positively in the face of adversity and to deal with the demands of high-level sport. It differed from having a positive attitude after setbacks in that coaches felt players could demonstrate mental strength *during* on-going pressure or demands. For example, one coach discussed how he felt that "the mental side is asking for that bit of allowance for the body and brain to go through the pain barrier". This mental toughness or ability to persist even under difficult conditions is summed up in the following quote:

"when you get to the elite level there's such a fine line between winning and losing or being the best or just coming second, and I think a big thing is – not getting beat up upstairs... you've got to be really strong upstairs".

The emergence of coping is consistent with previous research highlighting the importance of effective coping strategies for elite athletes (e.g., Nicholls & Polman, 2007), and these findings mirror those of Holt and Dunn (2004), who reported that elite youth football players employed coping strategies to respond positively to mistakes or criticism. It is possible that the development or use of effective coping strategies differentiates successful and non-successful athletes, although thus far only limited research has examined such differences. For example, Anshel and Kaissidis (1997) reported that less skilled female athletes used more avoidance coping than elite

male or female athletes. In addition, Gould, Dieffenbach, and Moffett (2002) identified mental toughness, which encompassed being resilient, persevering, and persisting in the face of setbacks, as a psychological characteristic of Olympic champions. In the present sample, coaches advocated a behavioural response to setbacks (e.g., investing greater effort, learning new skills) which is somewhat aligned with coping literature which identifies active or problem-focused coping strategies as most beneficial in terms of adaptation (e.g., Carver, Scheier, & Weintraub, 1989). This might suggest that coaches perceive problem-focused coping to be an effective strategy, providing greater support for its use over emotion-focused coping. *Committed.*

The theme committed was comprised of attributes and behaviours perceived by coaches to indicate a player who was committed to his/her sport. Sport commitment has previously been defined as "a psychological construct representing the desire and resolve to continue sport participation" (Scanlan, Simons, Carpenter, Schmidt, & Keeler, 1993, p.7). The raw themes in the present model reflected behaviours that indicated a desire or resolve by an athlete to continue with their sport, therefore were typically expressed over a longer duration (e.g., regular attendance) as compared to shorter duration indicators of effort (e.g., effort invested into a specific training session). The higher order theme 'committed' was comprised of three subdimensions; dedication, excellent attendance, and working in your own time.

In general coaches felt that succeeding in youth sport required "a huge commitment", and one way in which coaches felt that this could be demonstrated was by a consistent attendance at practices. One coach stated that although "at a club level, you just want them to turn up", at an elite level the expectations for players were much higher. For example, coaches felt that it was important for players to be

willing to undertake extra training if required, both of a formal nature (e.g., weighttraining or scheduled fitness work), or more informal development work (e.g., practising a skill, ball work). Coaches felt that they could recognise players who completed extra work, with one rugby league coach stating that "in terms of their physique – the extra training you can tell, you can tell in training which kids have been doing extra sprinting, you can tell which ones go out and do their own running". In addition, a football coach reported that "you can tell sometimes, well a lot of time, those that have gone off and actually focused on doing some one-on-one work with themselves, actually done some ball work, actually practiced an activity themselves". This dedication to their sport and their practice was consistently highlighted as an important attribute for progression.

Effort.

This dimension contained four subcategories which reflected athletes' physical investment of effort and time into their sport; a high quality of work or drills, working hard, putting effort into training drills over and above that which would be expected, and avoiding laziness. It was noteworthy that coaches recognised the importance of players completing drills to a high standard, with one noting that this "attention to detail and being consistent in practice efforts" was indicative of a 'good' trainer. Working hard was consistently emphasised, and coaches spoke of trying to develop a hardworking ethos among squad members (e.g., "we're all here to work hard so let's be honest about it"). It was felt that demonstrating extra effort, over and above the high levels expected, was illustrated by those athletes who were willing and able to push themselves harder than others, as "you know you are asking huge demands out of your body at that time, and the ones who are prepared to put their bodies through that will progress further and quicker than the ones who give in".

Finally, laziness emerged as an undesirable behaviour. Coaches described having athletes who were "always trying to take the easy option with it", and who "made errors in the game because of [their] laid back lazy attitude". Coaches felt that laziness inevitably "reduces the amount that you are getting out of each session", and so would be likely to impede progress. The focus on effort-based behaviours as representative of productive training is similar to previous findings (e.g., Morgan, 2004), and can be assimilated with proposals that investing effort and going the extra mile may be a consequence of engagement and commitment to an activity (e.g., Lonsdale, Hodge, & Jackson, 2007).

Seeking information to improve.

Seeking information to improve consisted of five sub-dimensions: asking questions, answering questions, self-evaluating, seeking feedback, and using negative feedback to improve. These behaviours were perceived to possess common characteristics in that they all involved the attainment or use of information to allow athletes to improve performance. It was universally agreed that asking questions was a positive behaviour, with one coach explaining that "the main reason I want to be asked questions or have questions in the session is that I know then – I have a better idea then whether they've taken on board what I've put across". As well as providing coaches with feedback regarding the understanding of information given, it was frequently stated that asking and answering questions was important for the athletes' own development. For example, it was stated that asking and responding to questions "increases the knowledge base of the team, stimulates self learning, and shows they [the athletes] are actively engaged in the session". Coaches indicated that they would ask questions at strategic points, (e.g., the end of a drill), to check players' understanding, and that the key learning points had been conveyed. Players who

responded to these questions were perceived as more engaged, and more likely to retain the information.

Another key sub-dimension of this category was self-evaluation, with one coach noting that "assessing good performance after a good training session is important". It was seen as important for athletes to assess their own performances and the way in which they trained, to highlight their own opportunities for improvements and "to learn from your mistakes". Furthermore, self-evaluation following an exceptional performance was promoted as a way in which to "condition yourself to repeat excellent performance". Some of the coaches interviewed described introducing training diaries or self-evaluation forms for athletes to complete in the hope of stimulating greater self-awareness and self-regulation.

In addition to self-evaluation, seeking feedback from others was also perceived as a desirable training behaviour. Coaches felt that the best players were those who would still be looking for advice or guidance on how to improve following a good performance, those who "wouldn't just accept the positive comments and say, yes, and stick their chests out and say haven't I done well; they'd still want to push themselves". It is worthwhile noting that coaches felt that although they would frequently offer feedback to players both during and after sessions, it was the responsibility of the player to seek extra help or comments, particularly if they were struggling or were unsure about something. The importance of players behaving in this way is highlighted by the following quote, that "if they approach us then they will get the help – and if they don't, well it's kind of ammunition for when you do release them". These behaviours differed from the more general dimension of asking questions, as this category focused specifically on players obtaining information about their own performance, as opposed to asking questions about aspects of a drill, for example.

Finally, coaches felt that the way in which athletes used any negative feedback or criticism was vitally important for their progression. It was frequently discussed how some players "are quite lackadaisical so if they do make a mistake, they don't seem phased or they don't seem to care", whereas others use negative comments to makes changes and improve. One coach stated that following criticism some of the players "will come and talk to you about it, they want to put right why they were railroaded, they want to know why they were railroaded and they don't shy from the fact – they just want to go on". Alternatively, "if they continually beat themselves up and don't respond from it, you know, you still have a severe problem". The quotations above indicate that coaches perceive individual differences in how athletes respond to criticism, however, it is unclear whether this is an individual trait, a reactionary response to coaching styles, or whether coaches could assist in developing more effective responses to critical feedback in their athletes.

The emergence of the higher order theme, seeking information to improve, is somewhat consistent with previous research findings. For example, behaviours highlighted such as self-evaluating are fundamental to effective athlete self-regulation as discussed by Young and Starkes (2006a). The most prevalent aspect of seeking information to improve concerned asking and answering questions from coaches, which also forms a key element of Harwood's (2008) 'communication' factor. However, the range of behaviours comprising this category in the present study extends previous findings, particularly with the emphasis on seeking feedback. In addition, coaches emphasised the perceived importance of these behaviours in terms of athlete development. Concentration.

It was unanimously agreed that concentration and focus were important training behaviours. Coaches felt that although you could make allowances with some of the younger age groups (e.g., under 12s), at higher levels it was crucial for athletes to pay attention throughout a session, in order to listen and understand the coaches' comments. Behaviours included in this cluster were listening carefully to instructions, so that "if you question them, they're listening", generally being "attentive" to what is happening, and not switching off. Coaches noted that players had a tendency to "switch off if they find something boring or something that isn't entertaining them". The emergence of this category is consistent with previous findings from coach interviews that distractibility is a maladaptive behaviour during practice (Morgan, 2004), and that concentration is perceived by coaches and athletes as a desirable quality for elite level athletes (Harwood, 2008). Coaches' perceptions of the importance of concentration for development provide additional support for the continued use of evidence-based interventions targeting enhanced attentional control skills.

Negative behaviours.

Despite the relatively high performance level of the sample and clear expectations regarding players' conduct, problems with some negative behaviour were also discussed. This dimension included both physical negative behaviour, through either messing around or being disruptive, and being negative verbally, through moaning or making negative comments about the session. The types of behaviours comprising the sub-category 'messing around' included minor behavioural irritants such as playing around with a ball whilst instructions were being given out or "turning round and chatting to mates". In contrast, being disruptive consisted of more
intentional negative behaviour such as moving equipment. In addition, certain players were highlighted as displaying a negative attitude through making negative comments about the session or the coach, or by moaning after completing drills/exercises. For example, one coach described a player who "you'd make run, and he would run and he'd do it – but then he'd have one hell of a moan about it and he'd try and get everyone else to be moaning about it". Coaches felt that the most annoying aspects of negative behaviour, from their perspective, were its effects on other players. For example, coaches stated that "some people want to clown around and it just disrupts everybody else". This was felt to inhibit the development not only of the player concerned, but also of other team members due to decreased productivity during sessions.

When discussing the above themes coaches also recalled specific players who had presented a problem and emphasised how this had interfered with their long-term careers within the sport. Although anecdotal, several cases were discussed in depth and it was apparent that coaches felt that certain players with potential had failed mainly due to behavioural problems. Such negative behaviour was evident in all teams discussed, with even international level coaches reporting low-level misbehaviour by some players. Negative athlete behaviour has received only limited attention in the literature. For example, Rutten et al. (2008) examined pro and antisocial behaviours in adolescent athletes, although this was in off-field and competitive contexts, not during practices. Although difficult to ascertain from the current analysis, it is possible that some of the behaviours described are symptomatic of an *absence* of the desired athlete attributes that have been the focus of previous studies. However, within the focus groups, negative behaviour was discussed as an entity in itself, rather than merely as the reverse or lack of more desirable training

behaviours. Also, when you consider the raw themes clustered under this category, they do not appear to be semantic opposites of the positive higher order themes. For example, the opposite of being disruptive or messing around would be along the lines of conforming, rather than investing effort or being committed. Where a negative behaviour was either (a) discussed as being the opposite of a desirable training behaviours, or (b) clearly represents the opposite of that behaviour, it was included in as an indicator of that positive behaviour (e.g., raw theme 'Lazy' in 'Effort').

General Discussion

In this study we sought to examine the perceptions of high-level coaches regarding training behaviours considered important for athlete development. The training behaviours and attributes which were discussed presented similarities with previous findings. In addition, there were some new findings such as the emergence of honesty and respect, self-evaluation, seeking feedback, and completion of drills to a technically high standard. However, there were some attributes previously highlighted in the literature that in the present sample were conspicuous by their absence, namely confidence and communication.

Communication skills did not emerge as a separate category in the current analysis, and although there were communication-related behaviours (e.g., asking and answering questions), coaches tended to emphasise the importance of these for gaining information, and when asked about communication more generally did not agree that it was a critical behaviour. Coaches suggested that being a good communicator was "an asset that you value in your periphery players, if they have lackings [*sic*] in other areas, it's something we value if they can actually communicate well with other people on the pitch". However, being a poor communicator was not perceived to be a limiting factor to attainment, with coaches frequently citing

examples of successful players with poor communication skills. In one focus group, it was suggested that although communication was not a required competency, it may be more important for certain leadership roles (e.g., captains) or tactical positions (e.g., fly half in rugby union). It is also possible that communication between players, rather than communication between the player and the coach, is a more important contributor to development, and in this case coaches may not be fully aware of its impact. These speculations require further investigation.

In addition, in the current data set confidence was not cited as an important training behaviour or attribute. It is possible that the importance of confidence is more likely to emerge when considering its impact on competitive performance outcomes (e.g., see Holt & Dunn, 2004) rather than progression during training. Alternatively, it may be that in the present sample coaches specified *types* of behaviours they felt a confidence or self-efficacy is positively related to an intensification of effort, to accepting challenging goals and persisting with these (e.g., Harwood, 2008), which were both highlighted in the present analysis. Given the pervasive links between confidence and sporting performance (e.g., Woodman & Hardy, 2003), further investigation is required to clarify whether confident athletes behave differently during training to less confident athletes.

When analysing the data it became apparent that the behaviours described contained both trait-like and state-like elements. It is likely that athletes may possess both a tendency to train in a certain way (e.g., some athletes might always be professional and have high levels of motivation), however, some training behaviours or attributes may fluctuate from session to session (e.g., a player may concentrate more during some sessions than others). Furthermore, some behaviours may have

both trait and state characteristics. For example, an athlete may have a tendency to invest high levels of effort into his training sessions, however, the actual effort invested may vary depending on session-specific variables such as whether it is enjoyable, whether he or she has had a hard day at school, bad weather, and so on. Although not problematic regarding interpretation of important themes in the present focus group data, this issue requires consideration when seeking to apply these findings. Specifically, if developing and utilising a measure of athletes' training behaviour, one would need to consider the most accurate way of conceptualising training behaviours. Similarly, from an applied perspective, trait-like behaviours may be less amenable to change as the result of interventions.

It is important to note some of the drawbacks relating to content analyses that may be particularly pertinent when considering the aims of the present study. It is inappropriate to make assumptions regarding the *relative* importance of the behaviours identified to each other. Furthermore, when considering the reflections of the coaches as a form of discourse, it is pertinent to note two points. Although we can conclude that the behaviours identified are considered by coaches in high-level team sports as important for progression, causal relationships between these behaviours and athlete development were not examined. The extent to which the reflections of the current sample accurately represent reality is unclear. It is possible that some of the emergent behaviours are critical in that they will present as limiting factors preventing long-term progression, however, equally some behaviours may be unrelated to the development of high-level players. A longitudinal study monitoring players' behaviour during training, and their progression over time, could further develop our understanding of this issue.

In addition to the methodological limitations considered above, the sports and coaches sampled possess common characteristics, which should be considered when generalising findings to other contexts. Although coaches felt that the behaviours identified would have relevance to a number of sports, the behaviours may have greater relevance, or indeed may only be relevant in the team sports examined, and it is possible that certain behaviours (e.g., professionalism) are uniquely important in high-level sport when compared with lower competitive levels. Additionally, it is possible that desirable training behaviours may vary between the youth athletes considered in the present study, and adult participants. For example, coaches may seek increased communication, decision-making or tactical input in training from more experienced players. An additional point worth noting is that the present sample consisted solely of male coaches, and it is possible that female coaches. Further research is required to establish whether the training attributes valued by female coaches, and coaches of adult athletes, are congruent with current findings.

Despite these limitations, there are a number of strengths of the present study, not least of which is the detailed range of behaviours identified within each general dimension. Whereas some previous researchers have presented simplified lists of desired characteristics, with few examples of actual behaviours typifying each characteristic, the current analysis provides a guide for identifying productive versus ineffective approaches to training by athletes. This can act as a framework on which to base interventions aimed at enhancing the progression of youth athletes, as well as a way of monitoring the efficacy of interventions targeted at increasing positive training behaviours. Future research could also consider whether coaching behaviours can promote desirable athlete training behaviours. For example, in the present sample

coaches reported asking questions to stimulate learning, providing training diaries to encourage self-evaluation, and using critical feedback to enhance players' effort levels. However, actual links between these coach behaviours and athlete responses have not been examined. Research should also focus on examining the antecedents of training behaviours, and whether training behaviours are influenced by coaching behaviour, by athletes' use of psychological skills (Woodman, Zourbanos, Hardy, Beattie, & McQuillan, 2010), or by level of engagement. What is clear is that there remain a number of potential research avenues to be explored in the context of athlete training and development. This is particularly salient given the growing profile and resource investment in youth sport in the UK. Chapter 4: Identifying important training behaviours.

Figure 1:

Hierarchical content analysis of important training attributes and behaviours.

Appearance (e.g. correct kit)		
Arrives Prepared]	
Time-Management (e.g., punctual)]	Professionalism
Honesty]	
Respect for coach		
Respect for team-mates	Respect	1. V2
Drive to be the best		
Drive to succeed]	
Competitive]	Motivated
Self-Motivated]	
Focussed on goals]	
Works hard following failure		1
Positive attitude following setbacks		12
Responds appropriately to success]	Coping
Mental Strength		
Dedicated		
Exœllent Attendance]	Committed
Works in own time		
High quality of work/drills		
Works Hard]	Effort
Extra Effort (above that expected)]	
Lazy]	
Asking Questions		
Answering Questions]	
Self-evaluates]	Seeking information to improve
Seeks Feedback]	
Negative feedback used to improve		
Listening to instructions		
Not switching off]	Concentration
Attentive]	
Moaning	Verbal	1 2
Negative Comments	1	Nagativa Pahawaya
Disruptive	Devrice	negative beliavours
Messing around		

CHAPTER 5

MEASURING ATHLETES' TRAINING BEHAVIOURS: DEVELOPMENT, INITIAL PSYCHOMETRIC VALIDATION, AND PRELIMINARY FINDINGS.

This research was partially presented at the 12th International Society of Sport Psychology World Congress, Marrakesh, Morocco, June 2009.

Training is an area of key applied importance in terms of the attainment of expert performance levels. Elite athletes may spend as much as 99 per cent of their sport-related time in the practice environment (McCann, 1995), and it has been argued that individuals need to accrue 10,000 hours of deliberate practice to become an expert (e.g., Ericsson, Krampe, & Tesch-Römer, 1993). Given this, it is somewhat surprising that to date there has been only limited investigation of athletes' behaviour within the training context.

Research examining athletes during training has thus far been restricted in its scope, conceptualising training as attendance or adherence to sessions or workouts (e.g., Palmer, Burwitz, Smith, & Collins, 1999), as performance on specific skills (e.g., football scrimmaging; Smith & Ward, 2006), or as the volume of work completed (e.g., Tharion, Harman, Kraemer, & Rauch, 1991). However, more recently researchers have begun to attempt to differentiate between effective and ineffective approaches to training. Young and Starkes (2006a, 2006b) compiled an inventory of swimmers' effective self-regulation during training, which included actions such as monitoring split times and completing prescribed warm ups. They found that coaches' ratings of swimmers' behaviours were correlated with actual behaviour, in that those who were deemed poor self-regulators completed less work during training. Young and Starkes proposed that this in turn would be related to impaired progress and goal attainment in these swimmers. However, this research focused solely on self-regulation and it is plausible that other important behaviours that might be more distally linked to self-regulation were omitted. In addition, it is unknown whether the behaviours identified are uniquely important for swimmers or whether they can be generalised to a broader range of sports.

In a related but separate strand of the literature, researchers have sought to identify attributes or competencies which are required for the progression and development of athletes, some of which have been described and/or measured through behaviours exhibited in the training context. For example, Harwood (2008) highlighted five desirable skills for the development of youth football players: commitment, communication, concentration, control, and confidence. Harwood specifically described three behaviours associated with each of the five targeted skills, including "showing elevated levels of effort" (commitment), "asking questions of coach about a drill or skill" (communication), "listening to instructions attentively and maintaining eye contact" (concentration), "maintaining high positive body language to all events and consistency throughout" (control), and "bringing a presence to training that exudes confidence" (confidence). In addition, from interviews with football players and coaches, Holt and Dunn (2004) identified that possessing coping strategies, the confidence to thrive on pressure, a determination to succeed, and a conforming dedication (i.e., complying with institutional demands, for example by obeying orders), in one's sport were likely factors contributing to progress. It is possible that these psychosocial competencies could be expressed behaviourally and potentially be monitored within the training environment.

Recent qualitative studies have been conducted to attempt to clarify which training behaviours are perceived as important for athlete progression. Morgan (2004) identified three maladaptive training behaviours in rugby players, namely withdrawal of effort, taking criticism badly, and distractibility. In Chapter 4 a series of focus groups, which attempted to combine and explore the views of high-level coaches from a range of sports, highlighted nine key factors as important for progression, namely professionalism (e.g., attending practice on time), a professional

attitude (e.g., showing respect for team-mates), motivation, coping with success, coping with failure, investing effort, seeking improvement (e.g., asking questions, self-evaluating), concentration, and (the absence of) negative behaviours (e.g., messing around, distracting team-mates). These qualitative findings provide a potential framework with which to develop the understanding of the nature of athletes' training behaviours, and their importance in terms of long-term development. To date, to the author's knowledge, there is no empirically developed and psychometrically validated measure of athletes' training behaviours available for researchers to utilise. The primary purpose of the present study was therefore to develop and validate a self-report measure of athletes' training behaviours. It was felt that this would provide a tool for highlighting differences in how players train and identify areas for improvement. In addition, from a research-oriented view it may enable scientists and practitioners to capture athletes' behaviour in a sport-related, but understudied, environment.

As discussed in Chapter 4, the factors identified included those which were attitudinal (e.g., motivation), which tended to encompass or reflect more intangible, intrapersonal dispositions (e.g., drive to succeed), whereas the majority were overtly behavioural (e.g., seeking improvement), referring to explicit, visible actions (e.g., asks questions). The coaches interviewed clearly felt firstly that all the factors highlighted were important determinants of progression, and secondly that some of the attributes could be directly observed. For example, when asked as to how they could identify athletes with a drive to succeed coaches responded "sometimes you can just tell", or "you can see it in them [the athletes]". Based on Chapter 4's findings, one of the intentions of the present study was to produce a measure of training which

retained both the attitudinal and behavioural factors, particularly given that research in this area is at an early stage.

Examining both attitudes and behaviours is consistent with existing literature pertaining to these constructs. An attitude is defined as an individuals' tendency to respond in a positive or negative way towards a certain event or object, and from a multidimensional perspective is argued to include cognitive, affective, and, crucially, behavioural components (Rosenberg & Hovland, 1960). In addition, attitudes can be assessed indirectly through behavioural measures (see Brock & Green, 2005), and are prevalent in theoretical models used to predict behaviour (e.g., Theory of Planned Behaviour; Fishbein & Ajzen, 1975). The relationship between attitudes and behaviours appears varied and complex, and it is therefore perhaps unsurprising that certain behaviours are perceived by coaches to reflect or display the players' attitudes, and some attitudes to be directly observable. It is also possible that some of the behaviours identified by coaches may be symptomatic of attributes, for example working hard may be a behavioural consequence of possessing a high motivation or a professional attitude. Psychometric testing of items based on the inductive model developed in Chapter 4 may assist in differentiating between the training behaviours.

One area of athlete training that has been examined in previous literature is athletes' use of psychological skills. Research has suggested that combining physical practice with psychological skill use can assist in skill acquisition and performance (e.g., Feltz & Landers, 1983; Ross, 1985). Descriptive research has also examined differences in psychological skill use during practice (e.g., Taylor, Gould, & Rolo, 2008), and, more typically, associations between psychological skill use and competition-focused outcomes including performance (e.g., Sheard & Golby, 2006) and anxiety (e.g., Fletcher & Hanton, 2001). However, associations between

psychological skill use in training and athletes' behaviours in training have not yet been examined. The second purpose of this study was therefore to examine associations between athletes' use of psychological strategies and training behaviours. Given that it might be expected that psychological skills would enable an athlete to train more effectively, the relationship between skill use and training behaviour should be positive. That is, it was anticipated that athletes who reported greater use of psychological skills would also report more effective training behaviours (e.g., greater effort, concentration, less negative behaviour etc.). In addition, where there were clear conceptual overlaps between certain psychological skills and training behaviours, it was expected that significant correlations would occur. More specifically, it was hypothesised that positive self-talk would correlate positively with effort and motivation, and that conversely negative thinking would be associated with impaired coping, concentration, and effort investment, and higher levels of negative behaviours. It was also anticipated that athletes who reported problems with emotional control would score poorly on coping and concentrating, whereas high levels of attentional control (i.e., the ability to focus attention effectively and maintain concentration) would be associated with high levels of concentration and effort, and low levels of negative behaviours. Finally, a more trait-like variable was also selected to examine the concurrent validity of the training behaviours measure. Achievement striving was chosen as it measures a facet of conscientiousness (Costa & McCrae, 1992), that was expected to be most closely related to effective behaviour during training. Conscientiousness, as a broader domain which includes facets such as dutifulness and order, would conceptually be more distally related to the training behaviour of an elite athlete than a facet focused specifically on striving for success. Hence, it was hypothesised that achievement striving would show positive

correlations with positive training behaviours such as professionalism, effort, and seeking improvement, and a negative correlation with negative behaviour.

A further area of interest in the present study was associations between athletes' training behaviours and self-talk, as self-talk has been associated with a number of training related variables that are similar in scope to those identified in Chapter 4. Self-talk is defined as any verbalization directed to oneself, either covertly or overtly expressed (Theodorakis, Weinberg, Natsis, Douma, & Kazakas, 2000). Self-talk has been associated with effort and persistence (Peters & Williams, 2006), attentional focus (e.g., Landin, 1994), and intrinsic motivation (Oliver, Markland, Hardy, & Petherick, 2008), and findings have also shown that self-talk is perceived by athletes to aid technique during skill execution (Chroni, Perkos, & Theodorakis, 2007), to assist with coping in challenging and difficult situations (Hardy, Gammage, & Hall, 2001), and to enhance concentration (e.g., Goudas, Hatzidimitriou, & Kikidi, 2006). Research has tended to focus on the effects on performance of the valence (e.g., positive or negative; Van Raalte et al., 1995), or type (e.g., instructional or motivational; Theodorakis et al., 2000) of self-talk, or on its perceived consequences (e.g., Hatzigeorgiadis, Zourbanos, & Theodorakis, 2007). Given that attaining elite performance levels requires extensive and repetitive deliberate practice, which is not necessarily inherently motivating, requires high levels of effort and attention, and does not lead to immediate social or monetary reward (Ericsson et al., 1993), in the context of training the possible motivational effects of self-talk are of particular relevance.

Oliver, Markland, and Hardy (2010) examined the motivational and affective effects of self-talk from the perspective of cognitive evaluation theory (CET), which is housed within self-determination theory (SDT, Deci & Ryan, 1985; 2000). In the context of intrapersonal events, CET posits that the functional significance or meaning that an event holds to the individual can be classified into one of three main types. Informational events facilitate need satisfaction by providing effectancerelevant feedback and the experience of choice, controlling events undermine need satisfaction by engendering pressures to act in particular ways, and amotivational events facilitate perceptions of incompetence and promote amotivation. Informational events are therefore likely to promote the development of self-determined forms of motivation, and enhanced well-being, whereas controlling events are likely to have negative consequences for motivation and well-being. Oliver et al. (2010) proposed that self-talk would function as an intrapersonal event in the ways that CET suggests, in that the relative salience of self-talk to an individual, or its functional significance, could be either controlling or informational. Their findings showed that in an educational setting, students' use of informational self-talk was positively associated with positive affect, whereas controlling self-talk was associated with higher state anxiety and negative affect.

Given that informational events should be expected to have positive consequences for need satisfaction, and result in the development of more selfdetermined forms of motivation, in the present study it was hypothesised that informational self-talk would be positively associated with desirable training behaviour, such as increased effort, motivation, concentration, and reduced negative behaviour. Conversely, controlling self-talk which should undermine self-determined motivation, should be associated with lower levels of desired training behaviours. It was theorised that positive training behaviours would be a direct consequence of selfdetermined motivation, in that individuals might be expected to possess more positive cognitions and affect regarding their sport, and subsequently invest and engage more

behaviourally, if participating for self-determined motives. In order to examine associations between the functional significance of one's self-talk and training behaviour, it was necessary to adapt the informational and controlling self-talk questionnaire developed by Oliver et al. (2010) for use with a sporting sample. Given that this questionnaire is still in the early stages of its development, and the importance of establishing a robust and valid measure for future studies, the psychometric properties of this measure of self-talk were also assessed in the present study.

To summarise, the purpose of the present study was threefold. First, to develop and test the factorial validity of a measure of athletes' training behaviours drawn from previous qualitative findings. Second, associations between training behaviours, psychological skill use, and achievement striving were examined to provide evidence of concurrent validity for the training behaviours measure. Lastly, the present study sought to confirm the structural validity of the informational and controlling self-talk questionnaire in a sports context. Given that the relationship between training behaviours and informational and controlling self-talk is of both theoretical and applied interest, and that an intention of this thesis was to test a model in which informational and controlling self-talk are related to training behaviours, the correlations between these constructs were also examined to provide preliminary evidence regarding their associations.

Method

Participants

Participants were 246 athletes (176 male; 70 female) with a mean age of 23.00 years (SD = 6.74). Participants were recruited from a range of team sports including football (n = 73), rugby league, (n = 51), rugby union (n = 38), American football (n = 25), and basketball (n = 17). Athletes were recruited predominantly from teams competing at club level (n = 175), or university level (n = 26), however some athletes were from teams competing at regional level or above (n = 36; county = 8, national = 19, international = 9). The athletes sampled had spent an average of 8.75 years (SD = 6.86) competing in their respective sports.

Measures

Training Behaviours

Based on qualitative findings from the focus group study in Chapter 4, items were developed to assess nine training behaviours identified as important for progression, namely professionalism (e.g., attending practice on time), a professional attitude (e.g., showing respect for team-mates), motivation, coping with success, coping with failure, effort, seeking improvement (e.g., asking questions, selfevaluating), concentration, and (the absence of) negative behaviours (e.g., messing around, distracting team-mates). Where possible, these items were based on direct quotes taken from the interview transcripts (cf. Hausenblas, Hall, Rogers, & Munroe, 1999). For example, one quote referred to the importance of players wearing "the correct kit for training", from which the item "I always turn up with the correct kit for training" was derived. During development, the items were assessed for their relevance and suitability through discussion with peers, both of whom have previously published work on measurement development.

From examining the transcripts and discussion of the important behaviours that emerged, it became clear that there were some conceptual differences in the nature of the behaviours. Specifically, whereas some training behaviours might be conceptualised as more trait-like in nature, for example coping ability or motivation, others may be more likely to vary on a session-by-session basis, for example negative behaviour or concentration. This presented an additional challenge when developing items, as for some of the behaviours a state-based assessment seemed inappropriate. For example, when considering coping with failure, items were developed to tap an athlete's response to the occurrence of negative feedback, criticism, or a setback etcetera. However, it is feasible that an athlete could complete a training session without experiencing any of these events. It may be more meaningful, therefore, to measure the athlete's general tendency to cope well with such occurrences. Consequently, two item sets were developed, one which assessed how athletes usually trained (trait version), and one designed to assess how athletes had trained during a specific session (state version).

To establish content validity, the item set was reviewed by two coaches, who had not been previously sampled, for feedback as to whether the items were relevant to athletes' training behaviours. In addition, a sample of ten athletes also completed the items to ascertain whether they made sense and were at an appropriate level of linguistic complexity for the intended sample. Following this process, a final pool of 71 items was produced; 43 items for the Trait Training Attitudes and Behaviours Questionnaire (TTABQ), and 28 items for the State Training Attitudes and Behaviours Questionnaire (STABQ). The trait questionnaire included subscales assessing professional behaviour, professional attitude, motivation, coping with failure, coping with success, effort, and seeking improvement. The state

questionnaire contained subscales measuring effort, concentration, seeking improvement and negative behaviours. Item sets are shown in Table 6 and 7 below. The TTABQ required athletes to rate items according to how they 'usually train', whereas the STABQ asked athletes to rate items according to how they trained in 'today's session'. All items were scored on a Likert-type scale ranging from 1 (strongly agree) to 7 (strongly disagree).

Informational and Controlling Self-talk.

Informational and controlling self-talk was assessed using the measure developed by Oliver, Markland and Hardy (2010) with a sample of undergraduate students to assess interpretation of self-talk in line with CET principals. In the present study, minor amendments were made to the instructional set to make it applicable to a sporting sample. Participants were asked to list the three most important things they said or thought to themselves during training. Following this, they were requested to respond to a number of items relating to their disclosed self-talk. The informational and controlling self-talk questionnaire was comprised of 11 items, which load onto two subscales (7 informational items, 4 controlling items). Participants were asked to rate the extent to which their self-talk "was self-critical" [controlling], or "made me feel I was in control" [informational], for example (see Table 7 for final item listing). Items were scored on a 5-point Likert-type scale from 1 (not at all) to 5 (very much so).

Concurrent Validity Measures.

Test of Performance Strategies.

Sixteen items from Hardy, Roberts, Thomas and Murphy's (2010) Test of Performance Strategies - 2 (TOPS-2), which measures athletes' use of psychological skills during practice and competition, were administered. Hardy et al.'s recent validation and refinement of the widely-used TOPS (Thomas, Murphy, & Hardy, 1999) provided support for its structural validity, and demonstrated high levels of internal consistency (scale α ranged from .71 to .85). The sixteen items comprised four 4-item subscales, which were selected as there were theoretical grounds for expecting them to correlate with specific training behaviours or self-talk subscales, and thus provide evidence of concurrent validity. The first subscale, self-talk, contained items such as "I motivate myself to train through positive self-talk", and was expected to correlate positively with informational self-talk, as well as with effort. The second subscale, emotional control, contained items such as "I have trouble controlling my emotions when things are not going well at practice", and was hypothesised to negatively correlate with coping (N.B. high scores on the emotional control subscale are associated with *poor* coping). The third subscale, attentional control, contained items such as "during practice I focus my attention effectively", and was expected to be positively associated with concentration and effort, and negatively associated with negative behaviours. The fourth subscale, negative thinking, was slightly modified to make it applicable to practice rather than a competition setting, for example "During practice [during competition] I have thoughts of failure". It was expected that this subscale would be positively correlated with controlling self-talk, and associated with impaired coping and effort investment, as well as higher levels of negative behaviours. Participants were asked to rate how frequently situations applied to them on a five-point Likert-type scale from 1 (never) to 5 (always).

Achievement striving.

In order to provide additional evidence of concurrent validity, the achievement striving subscale was taken from the Revised NEO personality inventory (NEO PI-R;

Costa & McCrae, 1992). The NEO PI-R has previously shown strong internal consistency (e.g., Piedmont, 1994), and is argued to be a reliable and valid measure of personality domains and facets (Costa, 1996). This ten item subscale required participants to rate the extent that they felt that each item accurately described themselves, on a five point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Items included "I do more than what's expected of me".

Marlowe-Crowne Social Desirability Scale.

Social desirability has long been recognised as a source of error variance in self-report inventories (Wiechman, Smith, Smoll, & Ptacek, 2000), and is probably the most cited criticism of self-report data (Chan, 2008). In order to assess whether social desirability was problematic in this sample, Strahan and Gerbasi's (1972) 13item short-form version of the Marlowe-Crowne Social desirability scale (Crowne & Marlowe, 1960) was administered. This has been shown to be a psychometrically sound and viable alternative to the full 33-item scale (Reynolds, 1982). Participants are given a series of items, such as "I sometimes feel resentful when I don't get my own way", and asked to indicate whether they were true or false in relation to them personally. A score for social desirability was calculated by summing the number of questions for which participants give the socially appropriate, yet highly unlikely, response.

Procedure

Initial contact was made via a letter or an e-mail sent to clubs or teams. Prior to informed consent being obtained, each participant received an information sheet stating the general purpose of the study and explaining the procedure and their rights. Once agreement to participate had been obtained, participants completed a questionnaire pack immediately following a typical training session. All participants

completed demographic questions establishing age, gender, competitive level, and length of time in the sport. In order to reduce the likelihood of common method variance, that is variance attributable to the measurement method rather than to the constructs the measures represent (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), a number of strategies were employed. Following Podsakoff et al.'s guidelines, where possible a range of scale anchors and formats were used, and developed scales included some negatively worded (reverse-coded) items. In addition, to attempt to reduce the effects of item priming and also participants' fatigue, the order of the questionnaires was counterbalanced. Furthermore, to reduce participant load with the aim of obtaining more accurate responses, two different questionnaire packs were distributed. Both contained the key measures of interest, namely the two versions of the training attitudes behaviours questionnaire and the self-talk questionnaire, and the social desirability scale. However, the concurrent validity measures were split with half the participants completing TOPS items, and half completing the achievement striving items. Participants were reminded that the information they provided would be kept confidential, and instructed to complete the questionnaires as accurately as possible, ensuring that they completed every question. The investigator was available to assist with any queries throughout.

Analyses

Confirmatory factor analyses were carried out to ascertain the structural integrity of both the self-talk questionnaire and the training behaviours measures. The factorial validity of the questionnaires was assessed via analysis of covariance structures using LISREL 8.12 (Jöreskog & Sorbom, 1993). In accordance with recommendations by Jöreskog (1993), a sequential approach to model testing was used, examining goodness of fit of single factor models separately, then in a full

model. The distribution of the variables violated the assumption of multivariate normality, and so the maximum likelihood method of estimation was used along with the Satorra–Bentler scaled χ^2 (Satorra & Bentler, 2001), which corrects for non-normality. The χ^2 statistic tests the null hypothesis that the model-implied and observed covariances are not significantly different, thus a good fit is indicated by a non-significant χ^2 .

Model goodness of fit was assessed using several fit statistics. The chi squared goodness of fit statistic (χ^2) is used to assess the discrepancy between the sample and fitted covariance matrices (Hu & Bentler, 1999). For the purpose of this analysis non-significant χ^2 values were considered to be indicative of a well fitting model. However, it is important to acknowledge that the practice of accepting or rejecting a model based solely on χ^2 has been widely criticised (e.g., Cohen, 1994). Hu and Bentler (1999) recommend that that the χ^2 statistic be used in conjunction with additional fit indices in order to avoid some of the sample size oriented problems associated with χ^2 (Bentler & Bonett, 1980). Hu and Bentler (1999) propose using a two-index presentation strategy of the standardized root mean square residual statistic (SRMR; Bentler, 1995) plus a supplemental fit index, but also warn that, when $n \leq 1$ 250, Bentler's Comparative Fit Index (CFI) and SRMR are preferable to the root mean square error of approximation (RMSEA; Steiger & Lind, 1980) and SRMR as the latter combination tends to overreject adequate models when sample size is small. More recently, Fan and Sivo (2005) have questioned the validity of this strategy and advocated the use of multiple fit indices.

In the present study goodness of fit was therefore determined with reference to chi squared, its degrees of freedom and significance value ($\chi^2(df)$ and p), the root mean square error of approximation (RMSEA; Steiger & Lind, 1980), the SRMR, and

the CFI. Hu and Bentler's (1999) suggested cutoff values of < 0.08 for SRMR, < 0.06 for RMSEA and \geq 0.95 for CFI were used in order to conclude that there was a relatively good fit between the hypothesised model and the observed data. In addition, modification indices were examined to highlight where improvements in model fit may be obtained by freeing specific constraints on model parameters. In particular, modification indices were examined to identify any amendments which would result in a large decrease in chi square. For example, modification indices for theta delta (i.e., the covariance between error terms) indicated the expected improvement in model fit that would occur if the measurement error associated with two items was assumed to be correlated. It should be noted that any *post hoc* model modifications should also have clear justified theoretical or logical grounds (MacCallum, 1995), as modifications emerging from this approach are susceptible to chance variations as a result of sample characteristics, particularly when sample size is small (Stevens, 2002).

Lastly, factor loadings were examined, with values below .3 considered to be low (Portney & Watkins, 2000), with t values also used to indicate whether the factor loading of each item was significant. Bivariate correlations were examined to explore associations between training behaviours, self-talk, and measures of concurrent validity.

Results

Initial Data Screening. Univariate outliers on the self-talk and training behaviours subscales were identified using casewise diagnostics, identifying cases outside three standard deviations from the residual mean. Out of the 13 variables tested, only ten participants appeared as outliers, across five of the subscales. One participant appeared as an outlier on two of the variables, and so was deleted from

further analyses. Examination of item responses for the self-talk subscale revealed that all items had been responded to using the full range of responses (i.e., 1-5). A full response range was also used for all items in the state training behaviours measure (i.e., 1-7). For the trait measure, five items showed responses from 2 to 7 only; with no participant reporting a 1 (the lowest scale point). This was not felt to be problematic, as three items loaded on motivation, and two on effort, and it was considered unlikely that participants would report no motivation or effort invested at all in a group that attend training sessions.

Confirmatory Factor Analyses

Training Behaviours

Trait Measure - Single Factor Models

Single factor models for each training behaviour were tested first to eliminate any poor loading items. The fit statistics for these single factor models are shown in Table 1 below.

Table 1: Initial Fit Statistics for Single Factor Models of Trait Training

Behaviours.

Training Behaviours	S-B $\chi^2_{(df)}$	RMSEA	CFI	NNFI	SRMR
Professional Behaviour	60.66 ₍₉₎ ; <i>p</i> < .001	.155*	.847*	.745*	.097*
Professional Attitude	16.43 ₍₅₎ ; $p = .006$.010*	.924*	.848*	.070*
Motivation	23.57 ₍₉₎ ; <i>p</i> = .005	.082*	.972	.954	.037
Coping with Failure	85.74 ₍₉₎ ; <i>p</i> < .001	.188*	.799*	.664*	.109*
Coping with Success	41.07 ₍₂₎ ; $p < .001$.285*	.718*	.154*	.130*
Seeking Improvement	62.68 ₍₉₎ ; <i>p</i> < .001	.158*	.892*	.820*	.092*
Effort	180.40 ₍₃₅₎ ; <i>p</i> < .001	.132*	.904*	.877*	.084*

* Indicates an unacceptable level of fit according to guidelines by Hu and Bentler (1999)

Examination of the factor loadings and modification indices for each subscale revealed a number of problematic items. Each subscale is considered in turn below.

Professional Behaviour: Item 16, "I bring everything I need to training", was removed due to high modification indices for covariance between error terms with other items, in particular with "I always turn up with the correct kit for training". It is possible that the word 'everything' was too general, and the item may also have some shared variance with the more specific item above. Following its removal, the subscale fit was acceptable (see Table 2).

Professional Attitude: One item (Item 2) was removed due to a low factor loading (.36) and high modification indices for covariance between error terms. This item, "I always show consideration for my team-mates", could be depicted as perhaps more behavioural than some of the other attitudinal items comprising this subscale, for example "I have a high regards for my coach" and "I respect my teammates". Although, as discussed earlier, both attitudes and behaviours relevant to training were retained from the qualitative study, it is possible that within individual subscales these items do not hold together well. Following its removal the subscale demonstrated an acceptable fit to data (see Table 2). On reviewing the content of the remaining items of the subscale, it was relabelled 'Respect', which what felt to be a more accurate reflection of the items within the scale.

Motivation: Despite showing adequate levels of fit by some indices, the items of this subscale were examined to identify any items contributing to the misfit. Item 18, "I am determined to have a successful career in my sport", presented with high modification indices for error terms. It is plausible that the content of this item, with

its explicit reference to a 'career', might not be relevant to the entire sample tested, which included some recreational teams. Even at higher levels of competition athletes may not perceive or aim for their sports participation to be a career. Following the item's removal the fit was acceptable (see Table 2).

Coping with Failure: Item 22, "I am mentally tough", had high modification indices for error covariance with items 4 and 11. Following the removal of this problematic item, the fit of the model improved but was still inadequate $(S-B\chi^2_{(5)}=27.91, p < .001; RMSEA = .13; CFI .89; NNFI = .88; SRMR = .073)$. In addition, item 26 "I bounce back from setbacks" was also highlighted as problematic, demonstrating high modification indices with item 4 "I can cope well with setbacks" in particular, possibly due to similarity in item content. Following the removal of this item, the model fit was acceptable (see Table 2).

Coping with Success: This was a four item scale, however, two items had very low factor loadings; "I lose focus if I have done well" (.23), and "After a good performance I don't train as hard as when I have done poorly" (.07). There were also high modification indices for error covariance for all items, with no clear pattern of problems emerging. Due to this, the items were combined with items from the coping with failure subscale to examine whether they loaded on a more general coping factor, however, this showed a poor fit $(S-B\chi^2_{(20)}= 188.78, p < .001; RMSEA = .19)$. In addition, a six-item general coping subscale comprised of the four coping with failure items and the two coping with success items that loaded well on their original factor was also a poor fit $(S-B\chi^2_{(9)}= 121.80, p < .001; RMSEA = .23)$. Given the difficulties with this subscale, it was dropped from the following analyses.

Seeking Improvement: Item 6, "if the coach criticises me, I work harder to improve", had both a low factor loading (.29) and high modification indices for theta

delta. It was postulated that as this item refers to a hypothetical situation, *if* the coach criticises a player, this might not be applicable during the majority of training sessions. This item presents a more complex scenario than other items, requiring participants to imagine both a certain occurrence and their typical response. The removal of item six improved the fit, however, it was still slightly below the established criteria for model fit (S-B χ^2 (5) = 18.05, *p* = .003; RMSEA = .10; CFI .97; NNFI = .95; SRMR = .047). Item 21, "I assess my performance after every session", was also highlighted as problematic, due to high modification indices for error covariance with other items. This was potentially due to its focus on behaviour following a session, whereas all other items focused on behaviour prior to or during a training session, which is a less ambiguous timeframe. Following the removal of both items the fit was acceptable (see Table 2). On examining the remaining scale items, it was decided to re-label the factor as Self-Improvement. This label clarifies that it is improvements in one's own performance that is referred to, rather than seeking improvement in team performance, or facilities etc.

Effort: This model showed poor initial fit, with several items demonstrating high modification indices for error covariance. On revisiting the content of the items, it was felt that it was possible that the effort factor was comprised of two distinct sub-factors, referring to effort within the session, and extra effort outside of formal sessions. Thus, three items, "I complete any additional workouts I am set", "I do extra training in my own time if needed", and "I am always willing to do extra workouts" were removed from the subscale to form a new factor, 'effort – extra'. Both the extra effort single factor model, and the in-session effort model, now demonstrated an improved to the data (see Table 2). The fit of the effort-extra

subscale remained slightly below conventional guidelines, however, as this was now a three item scale no further item removal was possible.

Training Behaviours	S-B $\chi^2_{(df)}$	RMSEA	CFI	NNFI	SRMR
Professional Behaviour	7.98 ₍₅₎ ; <i>p</i> =.157	.050	.984	.968	.043
Respect	4.85 ₍₂₎ ; <i>p</i> = .101	.073	.991	.974	.031
Motivation	$4.70_{(5)}; p = .454$.000	.996	.991	.023
Coping with Failure	4.58 ₍₂₎ ; <i>p</i> =.101	.073	.982	.947*	.036
Self-Improvement	0.57 ₍₂₎ ; <i>p</i> =.753	.000	1.00	1.03	.010
Effort in session	23.53 ₍₁₄₎ ; <i>p</i> =.052	.053	.981	.971	.046
Effort - extra	5.92 ₍₂₎ ; <i>p</i> =.052	.092*	.959	.938*	.083*

Table 2: Revised Single Factor Fit Statistics for Trait Training Behaviours:

* Indicates an unacceptable level of fit according to guidelines by Hu and Bentler (1999).

Trait Measure – Full model

A full model was then tested to assess the fit of the hypothesised structure as a whole and to highlight any low-loading items. A path diagram for the full model is shown in Figure 1 overleaf. Examination of the fit statistics indicated that the model represented an acceptable fit to data (S-B $\chi^2_{(413)}$ = 709.51, *p* < .001; RMSEA = .05; CFI .95; NNFI = .95; SRMR = .084). There was no clear pattern of problematic modification indices, therefore all items were retained. Intercorrelations between the subscales ranged from .45 to .91, indicating that although there was some conceptual overlap between the behaviours measured, they retained some unique variance. Given that the correlation between coping and motivation was > .9, an alternative model was tested in which the correlation between these factors was fixed at 1 (simulating a single factor). This more constrained model was a poorer fit to the data (S-B $\chi^2_{(414)}$ =

719.21, p < .001; RMSEA = .06; CFI .95; NNFI = .95; SRMR = .084), and a Satora-Bentler scaled difference test (Satorra & Bentler, 2001; Crawford & Henry, 2003) indicated that the first model was a significantly better fit (S-B scaled difference = 7.36, df = 1, p = .007). Cronbach's alphas ranged from .68 to .87 (see Table 8). Full listings of items and factor loadings for trait questionnaires are shown in Table 5 below.



Figure 1: Final path diagram for full model of trait raining behaviours.

State Measure – Single Factor Models

Single factor models for each state training behaviour were also tested to eliminate any poor loading items. The fit statistics for these single factor models are shown in Table 3 below.

Table 3: Initial Fit Statistics for Single Factor Models of State TrainingBehaviours.

Training Behaviours	S-B $\chi^2_{(df)}$	RMSEA	CFI	NNFI	SRMR
Effort	$15.92_{(14)}; p = .318$.024	.997	.996	.025
Self-Improvement	56.77 ₍₉₎ ; p <.001	.149*	.837*	.728*	.096*
Concentration	88.88 ₍₂₇₎ ; <i>p</i> < .001	.098*	.952	.935*	.059
Negative Behaviours	27.07 ₍₉₎ ; <i>p</i> = .001	.092*	.947*	.912*	.058*

* Indicates an unacceptable level of fit according to guidelines by Hu and Bentler (1999).

Examination of the factor loadings and modification indices for each subscale revealed a number of problematic items. Each subscale is considered in turn below.

Effort: Although the effort oriented items demonstrated good fit, examination of factor loadings indicated that one item, "I worked harder than everyone else" loaded relatively poorly on its intended factor (.37). As this item contained an element of social comparison, it was removed, improving the fit of this subscale (see Table 4 below).

Self Improvement: Two problematic items were identified, which both had high modification indices for error covariances with other items, and low factor loadings. These were item two "when I was unclear about the drills we were doing I asked questions" (.18), and item six "I thought about how I could have trained better" (.28). Examining the item content suggests that in the first instance, item two refers to a hypothetical situation "when I was unclear...", which may not occur during every training session. As such, it might not have been applicable to all athletes completing the measure about the session they had just finished. The second item, item six, appears quite general when compared to the other items in that subscale. The phrasing "I thought about how I could have trained better" might have been too vague for athletes to rate accurately. Alternatively, the reflection that the item seems to tap may be more likely to take place retrospectively, once the session has finished, making it less of a 'training behaviour'. Removing each item separately resulted in only marginal improvements in model fit, however, when they were both removed the model showed a good fit to the data (see Table 4).

Concentration: The concentration subscale initially showed a poor fit overall, and no major improvements were obtained by removing items individually. On reexamining the item content, it appeared that there may be the two slightly different factors present, one which taps focus or attentional concentration, and one containing items relating to the coach specifically, for example, "I paid attention to everything the coach said", "I switched off when the coach was talking to us" and "I listened carefully to the coach during training". When extracted, these three items held together as a single factor (S-B $\chi^2_{(2)}$ = 1.09, *p* = .578; RMSEA = .00; CFI 1.00; NNFI = 1.02; SRMR = .029). The remaining concentration items also showed a good fit as a single subscale (S-B $\chi^2_{(9)}$ = 9.83, *p* = .364; RMSEA = .02; CFI 1.00; NNFI = 1.00; SRMR = .026). However, when a pairwise model was tested with a concentration and a coach focus factor, the factors were very highly correlated (.98) and the model was a poor fit (S-B $\chi^2_{(26)}$ = 81.39, *p* < .001; RMSEA = .10; CFI .95; NNFI = .94; SRMR = .057). Therefore, all original items were included in a single factor and the modification indices re-examined. Items 15 "I was completely focused throughout the session" and item 19, "I switched off when the coach was talking to us" were removed due to a conceptual overlap. The model now demonstrated acceptable levels of fit (see Table 4 below).

Negative Behaviours: Item four, "I messed around during the session", showed high modification indices for error covariances with other items, possibly due to its similarity with other items such as "I misbehaved during the session". Following its removal, the fit was improved, however, it was still marginally above the cut-off criteria (S-B χ^2 (5) = 15.48, *p* = .008; RMSEA = .09; CFI .96; NNFI = .92; SRMR = .047). Item twelve, "I made negative comments about the session" also seemed problematic, perhaps as it refers to a very specific type of negative behaviour, whereas the other are a little broader, for example, misbehaving covers a larger range of behaviours. Also, in some environments athletes may refrain from overtly commenting on a session to prevent offending a coach for example. Following the removal of this item, the model showed an excellent fit to the data (see Table 4 below).

Training Behaviours	S-B $\chi^2_{(df)}$	RMSEA	CFI	NNFI	SRMR
Effort	10.23 ₍₉₎ ; <i>p</i> =.332	.024	.998	.997	.015
Self-Improvement	2.41 ₍₂₎ ; <i>p</i> =.299	.029	.995	.986	.030
Concentration	21.83 ₍₁₄₎ ; <i>p</i> =.082	.048	.984	.976	.042
Negative Behaviours	0.50 ₍₂₎ ; <i>p</i> =.778	.000	1.00	1.01	.009

Table 4: Revised Single Factor Fit Statistics for State Training Behaviours:

State Measure – Full model

A full model was then tested to assess the fit of the hypothesised structure as a whole and to highlight any poor or cross-loading items. Examination of the fit

statistics indicated that the model fit was marginally below acceptable guidelines (S-B $\chi^2_{(183)}$ = 408.75, *p* < .001; RMSEA = .07; CFI .95; NNFI = .94; SRMR = .091). Examination of the modification indices highlighted two items that were problematic. Both items, item 25, "I was lazy", and item 2 "I paid attention to everything the coach said", had high modification indices for error covariance, in particular with negative behaviours, indicating that these items may have been tapping a more generic poor behaviour and attitude than a withdrawal of effort or lack of attention specifically. Following the removal of these items the model showed a good fit to data (S-B $\chi^2_{(146)}$ = 261.51, *p* < .001; RMSEA = .06; CFI .96; NNFI = .95; SRMR = .074). A path diagram for the full model is shown in Figure 2 below. Intercorrelations between the subscales ranged from -.85 to .68. Cronbach's alphas ranged from .70 to .91 (see Table 8). Full listings of items and factor loadings for state questionnaires are shown in Table 6 below.



Figure 2: Path Diagram for full model of State Training Behaviours Questionnaire:
Table 5: Standardised Paramete	r Estimates for TAB-Q Trait Version.
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Item	Professional behaviour	Respect	Motivation	Coping	Self- Improvement	Effort - in session	Effort - extra
I always turn up with the correct kit for							
training.	.45						
I turn up for training with plenty of time to							
get ready.	.81						
I never miss a training session.	.46						
I am always on time for training.	.83						
I am professional in my approach to training.	.59						
I have a high regard for my coach.		.77					
I respect my teammates.		.55					
I am honest with coaching staff.		.54					
I show respect for my coach.		.79					

.63

.55

.63

I am totally committed to achieving my

goals.	.73	
I am highly motivated to succeed.	.81	
I am driven to succeed.	.80	
I am very competitive.	.56	
I am focused on succeeding in my sport.	.84	
I can cope well with setbacks.		.44
If I perform poorly I work hard to put things		
right.		.72
If things don't go my way I try harder.		.78
I am mentally strong.		.54
I check if I am doing as well as I should be.		
I assess my performance during every		
session.		
When I am given feedback I use it to		

improve.

I ask the coach for feedback on how I am doing. .52 I complete any additional workouts I am set. .73 I do extra training in my own time if needed. .70 I am always willing to do extra workouts. .78 I always try my hardest during training. .76 I put in 100% effort all the time. .71 Sometimes I ease off it I am not being watched. .33 I put as much effort into training as possible. .84 I am lazy during training. (R) .41 I always carry out drills as well as I can. .74 (R) Indicates a reverse coded item.

Table 6: Standardised Parameter Estimates for TAB-Q State Version

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Item	Effort	Self- Improvement	Concentration	Neg. Behaviour
I put maximal effort into the training session.	.86			
I completed all drills and workouts to a high standard.	.64			
I put as much effort into the session as possible.	.89			
I put in 100% effort throughout the session.	.87			
I was totally committed to working hard in the session.	.84			
I answered questions from the coach.		.31		
I asked the coach how I could improve my performance.		.80		
I evaluated how well I was performing.		.40		
I asked the coach how I could get better.		.87		
I had to be asked for instructions to be repeated because I didn't listen.			.35	
I thought about irrelevant things during the session.			.63	

I found it difficult to stay focused during the session63		
I was easily distracted during the session.	.84	
I listened carefully to the coach during training.	.46	
I felt my mind wander during the session.	.76	
I misbehaved during the session.		.63
I moaned during the session.		.66
I was told off during the session.		.56
I distracted others during the session.		.84

Self-talk questionnaire

As this measure had not previously been used with a sporting sample, prior to hypothesis testing, confirmatory factor analysis was carried out to ascertain its structural integrity. Initial single factor analysis of the informational self-talk subscale revealed a poor fit (S-B $\chi^2_{(14)}$ = 47.02, p < .001; RMSEA = .10; CFI .90; NNFI = .85; SRMR = .07). Examination of modification indices for error covariances and factor loadings revealed that item 3, "was self-encouraging", and item 10, "helped reduce the pressure I put on myself", were problematic. It was felt that the use of the word 'self' in item 3 was redundant, potentially increasing the complexity of the item. In addition, implicit in item 10 is an assumption that an individual has placed pressured on themselves, which might not have been the case. Following the removal of these items the informational self-talk subscale revealed a good fit to the data (S- $B\chi^{2}_{(5)} = 10.99, p = .052; RMSEA = .72; CFI .96; NNFI = .93; SRMR = .045).$ The fit of the controlling self-talk factor was acceptable (S-B $\chi^2_{(2)}$ = .34, p = .511; RMSEA < .001; CFI 1.0; NNFI = 1.0; SRMR = .021), and the full model also demonstrated a good fit to the data (S-B $\chi^2_{(26)}$ = 31.86, p = .198; RMSEA = .03; CFI .97; NNFI = .96; SRMR = .054). The full model is shown in Figure 3 below. Items and factor loadings are also shown in Table 7 below.

The reliability of the new subscales was tested by examining Cronbach's alpha coefficients. The informational self-talk scale demonstrated good reliability ($\alpha = .75$), however, the coefficient for the controlling self-talk subscale ($\alpha = .58$) was below conventional guidelines (e.g., Nunnally, 1978). Examination of the scale-if-item-removed statistics indicated that no one item was responsible for the poor reliability. Cronbach's alpha increases when correlations between items increase, and in this subscale the items are purposely designed to tap different aspects of a 'controlling'

event, for example, control, pressure, or criticism. As such, it is plausible that because the items are formative in nature (i.e., where the latent variable is a linear combination of manifest items), between-item correlations may be lower than when reflective indicators (i.e., those that are determined by their latent factor, and considered to be sampled from the domain of the latent construct) are used (for further explanation, see Dillon & McDonald, 2001). In order to ascertain whether the reliability was a function of variability in item loadings, the composite reliability index (CRI; Jöreskog, Sörbom, du Toit, & du Toit, 1999) was examined. The CRI is considered a superior measure to Cronbach's alpha as it does not assume equal weighting of items, and is calculated by using the item loadings obtained from within the nomological network (Fornell & Larcker, 1981). This more accurate measure of reliability resulted in a value of $\rho = .60$). Researchers have suggested that although low for practical application, alpha levels of > .6 may be considered sufficient for research use (Epitropaki & Martin, 2005). Given that this measure is still in the process of development and that the present study was exploratory, it was considered adequate to use.



Figure 3: Path Diagram for full model of Self-talk Questionnaire:

Item	IST	CST
Made me feel I was in control	.67	
Made me feel more in charge	.72	
Assisted my understanding	.50	
Provided me with positive feedback	.48	
Reassured me that I was in control	.78	
Made me feel pressured		.55
Made me feel I had no choices		.65
Was self critical		.32
Made me feel I had no control over the situation	×	.55

Table 7: Standardised Parameter Estimates for ICST-Q

Descriptives

Following confirmatory factor analysis, the means, standard deviations and reliability statistics for all the subscales of the training behaviours and self-talk questionnaires were calculated (see Table 8 below).

Measure	Subscale	Mean	SD.	α
ICSTQ	Informational Self-talk	3.49	.69	.751
	Controlling Self-talk	2.47	.74	.572*
TABQ Trait	Professional Behaviour	5.65	1.03	.759
	Professional Attitude	6.05	.83	.730
	Motivation	5.92	.95	.871
	Coping	5.67	.86	.695
	Self-Improvement	5.06	1.04	.676
	Effort (outside session)	5.47	1.22	.790
	Effort (within session)	5.37	.95	.757
TABQ State	Effort	5.58	1.15	.912
	Self-Improvement	4.23	1.27	.699
	Concentration	5.12	1.26	.787
	Negative Behaviours	2.33	1.32	.757
TOPS	Self-talk	3.47	.95	.912
	Emotional Control	2.53	.89	.830
	Attentional Control	3.62	.64	274
	Negative Thinking	2.23	.76	.756
NEO-IR	Achievement Striving	3.89	.67	.841
11	Self-Criticism	4.01	.67	.649

Table 8: Subscale Means, Standard deviations and Cronbach's alphas.

* Reliability weighted for factor loadings for CST = .599

Correlations

Social Desirability. The mean social desirability score of the sample (M = 7.79, SD = 2.62) was similar to those found in previous studies (e.g., Robinnette, 1991). There were no outliers, with no participant scoring more than three standard deviations away from the mean; however, two participants were removed from the final sample as they scored the maximum possible score (13) for social desirability. Bivariate correlations indicated that social desirability was uncorrelated with either subscale of the self-talk measure. Social desirability showed small to moderate positive correlations with training behaviours (rs ranged from .164 to .406), and a negative correlation with negative behaviour (r = -.255), indicating some shared variance between social desirability and training behaviours. These correlations were similar to those found with the TOPS subscales. For example, social desirability was significantly correlated with emotional control (r = -.255), and attentional control (r = .420). It is worthwhile noting that the size of the correlations between social desirability and concentration were similar, which is unsurprising given the overlap in terms of the scope of the two scales.

Concurrent validity measures

Bivariate correlations between the training behaviours subscales and concurrent validity measures were also examined (see Table 8). All correlations were in the direction hypothesised, with achievement striving significantly positively correlated with all positive training behaviours, and negatively correlated with negative behaviours (*r*s ranged from -.368 to .578). In addition, desirable training behaviours were positively associated with positive self-talk and attentional control, and negatively correlated with poor emotional control and negative thinking. Taking into account the number of correlations (n = 28), when a Bonferroni correction is

applied the new alpha equals .0018. Under these more stringent conditions, only five of the 26 significant correlations become nonsignificant. More importantly, because directional a priori hypotheses were made, Bonferonni's correction is redundant.

Lastly, correlations between informational and controlling self-talk, and the training behaviour subscales were examined (see Table 10). Informational self-talk was significantly positively associated with positive training behaviours (rs ranged from .127 to .374). Controlling self-talk was significantly positively correlated with negative behaviours (r = .215) and negatively correlated with concentration (r = .168).

	Achievement	TOPS Subscales:			
Trait:	Striving	Self-Talk	Emo. Control	Atten. Control	Neg. Thinking
Professional Behaviour	.339*				
Professional Attitude	.371**				
Motivation	.578**	.447**			
Coping	.540**		139		211*
Self Improvement	.396**				
Effort (outside session)	.473**	.233*		.317**	128
Effort (within session)	.487**	.285**		.490**	346**
State:					
Effort	.388**	.370**		.333**	188*
Self Improvement	.298**				
Concentration	.280*		368**	.599**	352**
Negative Behaviours	247*			321**	.228*
* Correlation is significant	t at $p \le .05$; ** Corr	elation is signif	icant at $p \le .01$.		

Table 9. Intercorrelations between State and Trait Training Behaviours and Concurrent Validity Measures.

Table 10. Bivariate correlations between State and Trait Training Behaviours and Informational and Controlling Self-talk.

Trait	IST	CST
Professionalism	.258**	025
Respect	.127	104
Motivation	.322**	046
Coping	.290**	026
Self Improvement	.374**	.005
Effort (external)	.221**	025
Effort (in session)	.229**	117
State		
Effort	.227**	057
Self Improvement	.317**	.061
Negative Behaviour	.067	.215**
Concentration	.163*	168*

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Discussion

The main aim of the present study was to develop and test the validity of a measure of athletes' training behaviours. Factor analyses confirmed that both the trait and state versions of the training attitude and behaviour questionnaire were a good fit to the data. In addition, all subscales demonstrated acceptable internal reliability (Cronbach's $\alpha \ge .68$), and correlations between the subscales ranged from low (r = .05) to high (r = .91), suggesting that despite some common variance, each dimension represented a conceptually distinct construct. Based on these findings, it appears that the training behaviours previously identified by coaches as important for athlete development (see Chapter 4) can be assessed and differentiated using these self-report measures, and that the questionnaires possess adequate structural validity.

Some modifications were made to the subscales as a result of the factor analysis procedures. These included the omission of the factor 'coping with success'. Although coping with success was highlighted by the focus groups in Chapter 4 as an important quality for athletes to continue to progress, the subscale had a poor fit. It is possible that success is a concept that is not compatible with the assessment of behaviour during training. With the focus of sport inherently involving competition, athletes may predominantly judge 'success' in relation to that context. One of the items "After a good performance I don't train as hard as when I have done poorly" emphasises that distinction, and may have led to some confusion as to which context athletes should be referring to when responding to these items. The other items comprising the scale required the athletes to consider how they respond to "doing well". This again may invoke a competition scenario. Another possible difficulty is that items which require athletes to consider that they have "done well" may be more difficult to respond to, particularly if athletes find it hard to recall or label their

behaviour as excellent. Finally, it is plausible that coping with success bears conceptual overlap with other training behaviours rather than emerging as a distinct behaviour itself. For example, the ability to continue to invest effort following success may be indicative of a motivated athlete, or one who continually seeks selfimprovement. Future research may wish to establish whether possessing the ability to deal well with success is a vital prerequisite to attaining and maintaining high performance levels, and whether this attribute can be demonstrated and differentiated within the training context.

Another development involved the split of the 'effort' factor into those items concerned with effort during a session and those concerned with effort externally. Although it could be argued that effort outside of the session is not strictly a training behaviour, this perspective assumes that training is limited to scheduled, formal, observed sessions. It is likely that individuals will engage in practice or training in their own time, indeed for certain types of training (e.g., fitness) it may be unnecessary for coaches to be present, and it may be more practical for athletes to undertake that training at a time that suits them. As such, and due to the emphasis coaches placed on the importance of this behaviour during the focus groups, trainingfocused effort outside of a session was retained in the trait version of the measure, as this subscale would be irrelevant to a state version relating to a formal session just completed.

In addition to assessing the structural validity of the training behaviours questionnaire, correlations with both the TOPS and the achievement striving subscale of the NEO PI-R provided evidence of concurrent validity, in that the measures hypothesised to have a theoretical overlap with training behaviours demonstrated significant associations. Achievement striving, defined as a need for personal

achievement and a sense of direction [in goal pursuit] (Costa & McCrae, 1992), was significantly positively associated with all ten positive training behaviours, and significantly negatively associated with negative behaviours. Furthermore, the largest correlation was between achievement striving and motivation (r = .578), which possess the highest degree of conceptual overlap.

With regards to the TOPS subscales, as hypothesised, practice self-talk was positively correlated with effort, at both a state and trait level. It was anticipated that a positive association would emerge as athletes who reported investing high levels of effort during training were considered to be more likely to make use of positive and encouraging forms of self-talk, perhaps to enhance their ability to train effectively. Practice self-talk was also significantly positively associated with all other positive training behaviours with the exception of concentration, suggesting that athletes displaying higher levels of positive training behaviours are making greater use of selftalk.

Emotional control was expected to negatively correlate with coping (given that high scores on the emotional control subscale are associated with *poor* coping). Although a negative correlation emerged, this was nonsignificant (r = -.139). Further examination revealed that emotional control was significantly correlated with only four out of the ten training behaviours, namely, effort, concentration, respect and negative behaviours. This pattern of associations may suggest that athletes who have difficulty controlling their emotions and become frustrated and upset during training are more likely to disengage, or to misbehave. It is unclear why there is no significant correlation with coping, and it is perhaps pertinent to note that there were problems with both coping subscales during measurement development. It is suggested that

further examination of the validity of the coping subscale is warranted in future studies.

The third subscale, attentional control, was expected to be positively associated with concentration and effort, and negatively associated with negative behaviours. This subscale was significantly positively associated with all positive training behaviours except self-improvement (state), and negatively correlated with negative behaviours. As expected, the strongest association was between attentional control and concentration (r = .599), which are closely aligned in terms of their scope.

Finally, the fourth subscale, negative thinking, was negatively correlated with coping, effort, motivation, respect, and concentration, and positively associated with negative behaviours. The largest correlation, between negative thinking and concentration (r = .352) perhaps highlights the link between negative intrusive thoughts and impaired concentration that has been previously reported (e.g., Borkovec, Robinson, Pruzinsky, & DePree, 1983). Overall, the expected patterns of associations between training behaviours and the various psychological skills provides some evidence that the subscales possess content validity.

With regards to the informational and controlling self-talk questionnaire, factor analysis confirmed that the hypothesised structure of this measure was a good fit to data. As expected, significant positive correlations were observed between informational self-talk and positive training behaviours. The sole exception (respect) was positively correlated at a level approaching significance. These associations suggest that athletes who use more informational self-talk also train in a more effective way. Based on the principles of self-determination theory, it is plausible that athletes' use of informational self-talk should have a number of benefits. First, informational self-talk should act as self-administered positive feedback, reinforcing

athletes' perceived competence. Second, it should serve to promote feelings of autonomy, emphasising the athletes' volition and control over their actions and environment. Combined, these need-satisfying effects are hypothesised to result in the development of more self-determined forms of motivation, as well as subsequent adaptive behavioural and affective outcomes. These are likely to include enhanced well-being and persistence (e.g., Pelletier, Fortier, Vallerand, & Brière, 2001), the latter of which may be reflected in the present study in the form of a more productive approach to training. This might also be aligned with previous findings showing that perceived behavioural control predicts athletes' adherence to training (Anderson & Lavallee, 2008).

A differing pattern of associations was observed between controlling self-talk and training behaviours. As hypothesised, controlling self-talk was significantly positively related with negative training behaviours, and negatively associated with concentration. Although the remaining correlations were small and nonsignificant, they portrayed a trend for negative associations between controlling self-talk and desirable training behaviours. Taken together this pattern of results suggests that the presence of controlling self talk is associated with a less desirable approach to training. Drawing from self-determination theory, controlling self-talk, that which places the individual under pressure and restricts autonomy, is likely to have detrimental consequences for motivation, and in turn athletes' approaches to training. The significant correlation with negative behaviours specifically, which includes moaning, messing about, and making negative comments, may reflect the inner conflict experienced by the athlete who is participating in an activity under conditions that undermine need satisfaction.

Given the differing pattern of associations the present findings might suggest that informational self-talk is more closely aligned with training behaviours than controlling self-talk. However, another possibility is that the observed statistical associations between controlling self-talk and training behaviours were attenuated by a weakness in the measurement of controlling self-talk. As previously discussed, the reliability of the controlling self-talk subscale was less than desirable. In addition, this subscale comprised of only four items compared with seven markers for the informational self-talk scale. It is possible that the generation and addition of new items when used in future investigations may increase the reliability of this scale. This may in turn allow a more accurate and detailed assessment of individuals^{*} controlling self-talk, and the demonstration of stronger associations with variables of interest. It is suggested that future studies using this measure should seek to develop a broader range of items, and subsequently conduct further psychometric testing.

Although the findings discussed have been considered from the perspective of the functional significance of one's self-talk influencing subsequent behaviour, it is necessary to emphasise that no evidence supporting a directional causal association has been generated. It is possible, for example, that effective training strategies trigger the use of more positive and supportive types of self-talk, or that athletes who train well are willing to put greater effort and time into the use of wider support strategies including psychological skills use. This is an issue requiring clarification in future research.

Thus far, it seems that the findings of this study provide some promising initial evidence that the trait training attributes and behaviours questionnaire (TTABQ) and the state training attributes and behaviours questionnaire (STABQ) are useful tools to obtain self-report measures of athletes' training behaviours. The questionnaires may

be beneficial for identifying productive versus unproductive approaches to training, as well as providing a framework for monitoring the efficacy of interventions targeted at increasing specific positive training behaviours displayed by athletes. Strengths of the present study include the detailed range of behaviours measured within each general dimension, a specific advancement on previous research, which has tended to focus on broader attributes (e.g., confidence; Harwood, 2008) or psychosocial competencies (e.g., discipline; Holt & Dunn, 2004). Additional methodological strengths include efforts to minimise common method biases, and the inclusion of social desirability data. This later facet of the current study is frequently under-reported in the development of novel self-report measures in sport and exercise psychology (e.g., Mallett, Kawabatta, Newcombe, Otero-Forero, & Jackson, 2007). Given the moderate associations between social desirability and athletes' self-reported training behaviours, it is clearly a relevant factor to consider in future studies. The similarities in the size of the correlations between training behaviours and social desirability, and between the TOPS and NEO PI-R and social desirability, suggests that this is not uniquely problematic for the developed training behaviours measures, but instead should be perceived as a factor of relevance to all self-report measures. It is suggested that future studies should include and report social desirability statistics to indicate whether it is likely to be problematic. Furthermore, it is possible that triangulation with observational methods or coach ratings of players' training behaviours may provide additional evidence that athletes' self-report scores are accurate. Lastly, it is possible that controlling for social desirability bias when assessing relationships between self-report variables may enhance the validity of such tests.

As this study was primarily developmental in its approach, there remain a number of limitations and areas for future research to address. The sample consisted predominantly of British Caucasian athletes, and the sports sampled possess common characteristics, which should be considered when generalising findings to other contexts. The behaviours identified may have greater relevance, or indeed may only be relevant in the team sports examined, and it is possible that certain behaviours (e.g., professionalism) are uniquely important in high-level sport when compared with lower competitive levels. As such, cross validation of both the relevance of the behaviours identified and the structure of the questionnaires in other samples is required.

In addition, it would be inappropriate, at this stage, to make assumptions regarding the relative importance of the behaviours included in the questionnaire, as there is no evidence concerning predictive validity and it is not known whether these training behaviours influence players' development. A longitudinal study monitoring players' behaviour during training, and their progression over time, may further develop our understanding of this issue. Future research may also consider whether coaching behaviours can promote desirable athlete training behaviours. For example, in the focus groups forming the basis of item development (Chapter 4), coaches reported asking questions to stimulate learning, providing training diaries to encourage self-evaluation, and using critical feedback to enhance effort. However, the actual links between these coach behaviours and athlete responses remain unclear. Lastly, given the emergence of positive associations between desired training behaviours and the use of psychological skills, including informational self-talk and positive self-talk, it may be prudent to examine this relationship further. It would be of considerable interest, for example, to establish whether there was a causal link

between psychological skill use and training behaviours, and to investigate whether the promotion of athletes' use of psychological skills resulted in enhanced training engagement.

CHAPTER 6

THE ROLE OF SELF-TALK IN ATHLETES' EXPERIENCE OF THE MOTIVATIONAL ENVIRONMENT IN SPORT: TESTING A PREDICTIVE PATHWAY MODEL USING PLS.

This research was presented at the 4th International Conference on Self-Determination Theory. Ghent, Belgium, May 2010.

Given the widely cited proportional imbalance between the time athletes spend training and competing (e.g., McCann, 1995), and the importance of training for athletic development and performance attainment (Galton, 1979), it is imperative to understand in greater detail how athletes train, and how best to maximise training efficiency (Woodman Zourbanos, Hardy, Beattie, & McQuillan, 2010). The frequent, repetitive training required to refine highly specialised skills is not necessarily inherently motivating, requires high levels of effort and attention, and does not lead to immediate social or monetary reward (Ericsson, Krampe, & Tesch-Roemer, 1993). Given this, researchers have identified strategies aimed at enhancing interest and motivation during training. For example, Green-Demers, Pelletier, Stewart, and Gushue (1998) found that creating challenges, adding variety to the task, providing self-relevant rationales for task performance, and exploiting stimulation from sources other than the task itself, were associated with enhanced interest during training. Furthermore, Green-Demers et al. reported that the use of such strategies resulted in more adaptive forms of motivation, that is, those that have been shown to result in enhanced persistence and reduced drop-out (e.g., Pelletier, Fortier, Vallerand, & Brière, 2001).

Recent research has also suggested that athletes may make use of psychological skills to enhance the quality of their training. Woodman et al. (2010) reported that psychological skill use (e.g., goal setting) was associated with a number of training outcomes. Specifically, goal setting was positively related to quality of preparation and negatively related to distractibility, and emotional control positively predicted athletes' ability to cope with adversity during training. These findings are aligned with the associations reported in Chapter 5 of this thesis, in which a number of psychological skills were correlated with training behaviours. For example,

Chapter 6: Self-talk and training behaviours.

attentional control and positive self-talk were positively correlated with concentration and effort, and with effort and motivation respectively. Given the emergence of positive associations between desired training behaviours and the use of psychological skills, it was considered prudent to examine this relationship further. It is of considerable interest to establish whether there may be links between psychological skill use and training behaviours, and to investigate whether the promotion of athletes' use of psychological skills results in enhanced training engagement. The present study examined the role of a specific psychological skill, self-talk, in athletes' experience of, and behaviour in, the training environment.

Further rationale for examining the possible motivational and behavioural effects of self-talk within sport can be developed via critical appraisal of the existing literature. Previous research purporting to examine motivational self-talk lacks an appropriate theoretical basis and as such fails to adequately conceptualise motivational self-talk (see Chapter 1). It has been argued throughout this thesis (specifically, see Chapters 1, 2, and 4) that self-talk is likely to impact upon cognition, affect and behavioural outcomes via the mechanism of psychological need satisfaction. Previous studies have provided initial evidence that self-talk can be conceptualised as an internal event that is experienced as having, to varying degrees, informational and controlling aspects (e.g., Oliver, Markland, & Hardy, 2010). This conceptualisation is based on the propositions of cognitive evaluation theory (CET; Deci & Ryan, 1985; 2000) that the functional significance of an experienced event, whether internal or external in origin, has three aspects, namely informational, controlling, and amotivational. In turn, the nature of the meaning or experience of that event to the individual has consequences for motivation and well-being. Events

experienced as informational¹ are predicted to enhance autonomy and competence, and subsequently positive well-being and more self-determined forms of motivation for the behaviour engaged in (Deci & Ryan, 1985). Conversely, events experienced as controlling undermine feelings of autonomy, resulting in controlled behavioural regulation and impaired well-being. Lastly, amotivational events are those that promote feelings of incompetence, and hence result in a lack of motivation towards the task.

Building on this framework, in the context of athletes' training it was suggested that informational and controlling self-talk would be positively and negatively associated with need satisfaction, respectively. Furthermore, it was proposed that need satisfaction would predict athletes reporting a more productive and engaged approach to training, as evidenced by an increased incidence of positive training behaviours, and less negative behaviour. Some support for these hypotheses is presented in Chapter 5 of this thesis. Associations between informational and controlling self-talk used during training, and self-reported training behaviours indicated that informational self-talk was associated with a range of positive training behaviour. Although need satisfaction was not measured, it was tentatively proposed that informational self-talk may act as self-administered positive feedback, increasing feelings of competence and asserting one's autonomy. These need satisfying effects are theorised to result in more self-determined motivation, which would then result in

¹ To aid conciseness and for ease of expression from here on these will be referred to as 'informational events' or 'controlling events' respectively. However, in line with the clarification provided by Deci and Ryan (1985), although events can be given the designation informational or controlling if the majority of individuals are likely to experience them as such, the concept of functional significance takes precedence, that is that it is how *the individual* in question experiences an event that determines whether it is informational or controlling (see also Chapter 3).

more positive and effective training. Conversely, controlling self-talk was posited to undermine autonomy, resulting in reactive negative behaviours and impaired task concentration.

Some additional support for the proposed links between need satisfaction and athlete training is provided by self-determination theory (SDT)-based research which has examined the effects of need support and satisfaction on motivational, and in turn, behavioural outcomes. The majority of this research, however, has focused on either increased likelihood of free-choice task engagement (e.g., Deci, Eghrari, Patrick, & Leone, 1994), or greater long-term task persistence (e.g., Pelletier et al., 2001). Both these behavioural outcomes are theorised within SDT to result from the internalisation of behavioural regulation for a task, promoted under conditions which satisfy basic needs. Adherence to exercise training regimens has also been shown to be improved for those who report greater need support (and by implication, greater need satisfaction; e.g., Williams, Grow, Freedman, Ryan, & Deci, 1996). However, it is argued that from both an applied and theoretical perspective it is of interest to examine in greater detail the behavioural consequences of need satisfaction. First, contextually an elite professional sport training environment permits only limited variation in attendance for training. It is of interest to understand to what extent athletes are engaging fully in training once they are there, not merely whether they are present or not. Second, it is of interest to study short-term changes in athletes' behaviour that might predict the likelihood of their drop-out in time, or their progress within the sport. From a wider perspective, although research has established the consequences of need satisfaction in terms of wellbeing, predicting the quality of an individual's engagement in a task (particularly where participation is compulsory)

may have important implications in other domains (e.g., for business in terms of predicting productivity).

Past research has considered athletes' responses to need support over varied periods of time (e.g., season to season, Pelletier et al., 2001; one training session, Gagné, Ryan, & Bargmann, 2003). In line with these studies and the original predictions of SDT, direct positive associations between coaches' need support and athletes' need satisfaction were predicted. Therefore, in the present study, a sequential model was tested that examined need support, self-talk, need satisfaction and behaviour, at a state level (i.e., during one training session). Associations were tested at the state level primarily due to the focus of the thesis on the role of self-talk. Oliver et al.'s (2010) informational and controlling self-talk questionnaire was designed to assess the functional significance of self-talk retrospectively at the end of a short, fixed period of time. Although it may be possible to measure individuals' trait use of self-talk, studies of cognition suggest that there may be difficulties in terms of reporting biases when attempting to recall thought processes over longer durations (e.g., recency recall effect; Murdoch Jr., 1962). As such, it was felt that athletes' reporting of their state use of self-talk and recent training behaviour would be more accurate than examining trait tendencies, and might in turn result in stronger associations emerging between variables of interest. Furthermore, Lodge, Trip, and Harte (2000) note that when choosing a cognitive assessment method, researchers should be guided by the purpose of the assessment and the setting in which it occurs. Given that from an applied perspective short-term changes in athletes' behaviour might be useful ways of monitoring progress, or indicators of athletes' need satisfaction, examining links between self-talk and behaviour during one training session seemed an appropriate focus.

When postulating hypotheses concerning the effects of need satisfaction on athletes' training behaviour, it is also possible to draw from the engagement literature. For example, Hodge, Lonsdale, and Jackson (2009) reported that satisfaction of needs for autonomy and competence predicted higher levels of athletes' engagement in sport. Although Hodge et al. conceptualise engagement as "a cognitive-affective experience... characterized by confidence, dedication, enthusiasm, and vigor" (Hodge et al., 2009, p.187; emphasis added), in other domains engagement is seen to have a behavioural component (e.g., Finn, 1989). If need satisfaction results in higher levels of confidence, vigour, enthusiasm, and dedication, this is likely to be reflected positively in athletes' behaviour during training sessions. Furthermore, research grounded in other theoretical paradigms has shown that support and provision for individuals' needs² is associated with greater on-task behaviour, commitment, and effort investment (e.g., Bass, 1990). Taken together, these findings support the hypothesis that need satisfaction would lead to desirable training behaviours, namely increased effort, self improvement, enhanced concentration, and fewer negative behaviours.

In addition to examining the consequences of informational and controlling self-talk, a second underlying theme of this thesis is exploring the antecedents of selftalk. Grounded in SDT, the first study of this thesis provided evidence that different types of self-talk can be a consequence of the motivational environment. Oliver, Markland, Hardy, and Petherick (2008) demonstrated that autonomy-supportive and controlling conditions affect the content of individuals' self-talk and motivation for a novel task. Specifically, under controlling conditions self-talk contained more

² Please note the term 'needs' here is used in the context of general requirements or demands, rather than self-determination theory's proposed innate psychological needs.

negative phrases, and more words associated with undesirable emotional states (e.g., anger, frustration). Conversely, in an autonomy-supportive environment self-talk was more informational in nature, and contained more encouraging or motivational phrases. It was argued that these findings suggest that individuals may model self-talk from their social surroundings. Furthermore, individuals' self-talk may be a means by which they interpret and internalise social messages (cf. Lawrence & Valsiner, 2003). This is important as SDT states that supports for autonomy, relatedness, and competence allow individuals to actively transform the values of significant others and external regulation of behaviour into their own (Deci & Ryan, 2000). Thus when the social environment is supportive of individuals' needs their self-talk may promote the process of internalisation.

Consequently, the present study sought to further investigate the impact of the social environment by examining associations between need support and individuals' use of informational and controlling self-talk. Drawing from the findings of Chapter 2 and the propositions of CET, it was expected that need support would predict the use of informational (positively) and controlling (negatively) self-talk, which in turn would be positively and negatively related, respectively, to need satisfaction. In line with previous findings (e.g., Gagné et al., 2003) direct positive associations between need support and need satisfaction were also predicted. Self-talk is proposed to mediate the relationship between need support and need satisfaction as it is suggested that it is a mechanism through which individuals make sense of and process their environment (cf. Lawrence & Valsiner, 2003). That is, the functional significance of an individuals' self-talk is expected to be modelled from the social environment, which in turn causes changes in need satisfaction.

Experimental SDT based research has identified effects of environmental conditions on psychological need satisfaction (e.g., Sheldon & Filak, 2008; Williams et al., 1996). There are numerous additional studies testing SDT's proposed motivational pathways that have also supported associations between need support and need satisfaction (e.g., Standage, Duda, & Ntoumanis, 2005; Ratelle, Larose, Guay, & Senécal, 2005). Within this body of research, however, there is a lack of consistency regarding how need support is conceptualised and measured. For example, need support has been considered as a higher order factor (e.g., composed of autonomy support and relatedness support; Niemiec et al., 2006), or subdivided into three distinct factors (i.e., autonomy support, competence support, and relatedness support; Sheldon & Filak, 2008). Deci and Ryan propose that need supportive environments are comprised of three, highly interrelated dimensions, namely autonomy-support, structure, and involvement, which impact upon autonomy, competence and relatedness, respectively (Ryan, 1991). Autonomy support refers to the provision of choice, an emphasis on personal control, and support for personallyendorsed behaviour. Structure refers to provision of clear feedback and guidance to form a framework for successful task engagement. Involvement refers to the provision of genuine closeness, empathy, and care for an individuals' wellbeing. It has been argued that previous research typically uses measures that include elements of all three need support components, often inaccurately labelled 'autonomy support' (Markland & Tobin, 2010). Given that the need support components tend to be highly correlated, research that has measured them separately has combined the three dimensions to form a 'need support' factor, which has strong predictive qualities (e.g., Markland & Tobin, 2010). However, it is important to consider that the three dimensions are conceptually distinct, and have been shown to have unique causal

effects (e.g., Sheldon & Filak, 2008). In the present study, need support was considered to be a higher order variable, comprised of autonomy-support, structure and involvement.

To summarise, the present study tested a hypothesised model (see Figure 1 overleaf) in which need support would positively predict informational self-talk, and negatively predict controlling self-talk. Need support would have both direct and indirect (via self-talk) associations with need satisfaction. Finally, need satisfaction was expected to be positively related to athletes' effort, concentration, and seeking information to improve, as well as being negatively associated with negative behaviours.

Figure 1: Hypothesised model of relationships between need support, informational and controlling self-talk, need satisfaction, and training behaviours.



Method

Participants

Male (n = 92, $M_{age} = 16.42$, SD = .80) youth soccer players were sampled for the present study. All players were on full-time professional scholarships, contracted to clubs in the English professional leagues. These scholarships typically involve daily attendance during the week to complete training, educational courses, and jobs for the clubs, as well as playing matches at weekends. Players are usually required to live within a reasonable distance from the club, and may be housed in club-owned accommodation. The standard of the clubs sampled ranged from Premier League to League Two. Players trained on average 6.1 times a week (SD = 1.78), spending 17.62 hours training per week (SD = 10.48). Players had been competing at football for an average of 9.81 years (SD = 2.00). In order to increase the chances of obtaining data reflecting realistic training behaviours, players were tested during the main competitive season, an average of 3.88 days (SD = 2.94) before their next competitive games. Nine coaches ($M_{age} = 42.25$, SD = 5.12) were asked to rate players' training behaviours. The coaches sampled had on average 10.88 years of coaching experience (SD = 6.30).

Measures

Need support.

Players' perceptions of their coaches' need support were measured using a modified version of Markland and Tobin's (2010) scale. This consisted of 15 items designed to measure perceptions of the need support provided by exercise practitioners. Some items were slightly modified to ensure that they were relevant to the sporting context (e.g., "Help me to feel confident about exercise" and "Make it clear to me what I need to do to get results" became "Helped me to feel confident"

and "Made clear what I needed to do"). Participants were required to rate the extent to which their coach provided support for autonomy (e.g., "encouraged me to take my own initiative"), structure (e.g., "gave clear and understandable instructions"), and involvement (e.g., "was concerned about my well-being"). Players rated the extent to which they agreed with the statements regarding their coach's behaviour 'in today's session only' [state]. Items were rated from 1 (strongly disagree) to 5 (strongly agree). Markland and Tobin (2010) reported that the measure demonstrated structural validity and reliability, with a principal components analysis yielding a single factor accounting for 69.66% of the variance with an exercise population (factor loadings ranged from .64 to .93; Cronbach's $\alpha = .97$).

To provide an alternative rating of coaches' behaviour, coaches' need support during the session was also rated by the researcher who observed the session from the sidelines. The observer remained within audible range of the coach so that any communication with players could be overheard. The main rationale for including an observer rating of coaches' support was to provide a basis for comparison to examine correlations with players' ratings. As such, this measure was included only as additional information, and was not intended to be included in the tested model. A checklist modified from Reeve, Jang, Carrell, Jeon, and Barch's (2004) rating scale for teachers' provision of autonomy support, structure and involvement was adapted to assess coaches' behaviour. Based on components identified in previous selfdetermination theory based research, Reeve et al.'s checklist lists 13 items in a bipolar format, with supportive indicators (e.g., 'nurtures interest, enjoyment, challenge') scored as 7, and unsupportive indicators (e.g., 'seeks compliance, uses incentives, consequences, directives') scored as 1 (for further details on scoring see Reeve, 2002). Reeve (2002) reported that the subscales demonstrated acceptable reliability, and also
showed predictive validity in relation to students' ratings of teacher behaviour, and student engagement.

Functional Significance of Self-talk

Players' use of informational and controlling self-talk was measured by adapting the informational and controlling self-talk questionnaire (ICSTQ) developed by Oliver et al. (2010) with a sample of undergraduate students, to assess interpretation of self-talk in line with CET principals. In order to aid recollection of their self-talk, participants were asked to list the three most important things they said or thought to themselves during training. Instead of rating each statement separately, the modified questionnaire asked participants to consider their self-talk across the session as a whole. Participants were requested to respond to seven informational items and four controlling items relating to their disclosed self-talk. For example, participants rated the extent to which their self-talk "was critical" (controlling) or "made me feel I was in control" (informational). Items were scored on a 5-point Likert-type scale from 1 (not at all) to 5 (very much so). The item structure of this measure was confirmed in a sporting sample in Chapter 5 of this thesis, showing a good fit to the data (S-B $\chi^2_{(26)}$ = 31.86, *p* = .198; RMSEA = .03; CFI .97; NNFI = .96; SRMR = .054).

Need Satisfaction

Within session satisfaction of autonomy, competence, and relatedness were assessed using subscales derived from existing measures designed to assess situational need satisfaction. Satisfaction of autonomy was measured using Sheldon, Elliot, Kim, and Kasser's (2001) three item subscale. Sheldon et al. reported a principal components analysis that established that the three items had high factor loadings (>.64) and comprised one distinct factor in the manner hypothesised. In response to

the stem "during this session I felt", participants were asked to rate items including "that my choices were based on my true interests and values". Items were rated on a five point Likert-type scale from 1 (not at all) to 5 (very much so).

Competence was measured using the six item perceived competence subscale adapted from McAuley, Duncan, and Tammen's (1989) Intrinsic Motivation Inventory. Players were asked to rate the extent to which, during training, they felt "pretty skilled at this activity", for example. Items were rated from 1 (not at all) to 5 (very much so). This subscale has previously been shown to possess good validity (McAuley, Duncan, & Tammen, 1989), and has been widely used in sports-based self-determination theory literature (e.g., Gagné et al., 2003).

Relatedness was measured using the acceptance subscale of Richer and Vallerand's (1998) relatedness scale. Participants were asked to rate items following the stem "In relation to my coach/teammates, in this session I felt". The scale consisted of five items, including "valued" and "safe". Items were rated from 1 (not at all) to 5 (very much so). This subscale has shown acceptable reliability and validity in both organisational (Richer & Vallerand, 1998) and sporting contexts (e.g., Sarrazin, Vallerand, Guillet, Pelletier, & Cury, 2002).

Training Behaviours

Training behaviours were measured using the questionnaire developed in Chapter 5 of this thesis. The state training attributes and behaviours questionnaire (STABQ) consisted of 19 items measuring effort (n = 5; e.g., "I put maximal effort into the training session"), concentration (n = 6; e.g., "I listened carefully to the coach during training"), self improvement (n = 4; e.g., "I evaluated how well I was performing"), and negative behaviours (n = 4; e.g., "I moaned during the session"). The STABQ asked athletes to rate items according to how they trained in 'today's session'. All items were scored on a Likert-type scale ranging from 1 (strongly agree) to 7 (strongly disagree).

As well as a self-report measure, coaches were asked to rate each player's training behaviour in that session using a ratings grid (see Appendix L). Again, this was to examine correlations with the players' self-report ratings. It was expected that, in line with previous studies (e.g., Morgan, 2004), correlations between coach and players' ratings should be moderate to strong. Coaches rated each player on the four behavioural subscales of the STABQ. Examples of indicator behaviours for each subscale were provided to coaches to give them a clearer understanding of what was required. High scores indicated that players engaged in the behaviours a great deal (i.e., they put in a lot of effort, concentrated well, sought ways to improve, or engaged in high levels of negative behaviour).

It could be suggested that observer ratings of behaviour are less susceptible to self-report biases (e.g., Fujita, Deinere, & Sandvik, 1991); however, players' selfratings were used in the final model as opposed to coaches' ratings for two reasons. First, players completed the validated full version of the STABQ, which contained more detailed and reliable subscales when compared to the single item rating sheet used by the coaches. Second, the variables measured included both behavioural and attitudinal items (see Chapter 5 for discussion of this classification). Whereas a coach may be able to rate a player's effort using observable behaviours (e.g., completing a drill at a high intensity, physical exhaustion), it may be harder for them to accurately rate concentration (e.g., a player may lose focus but not show any observable sign that it occurred). The consistency of observer and self-ratings varies widely depending upon the behaviour being rated (e.g., Hilarius, Kloeg, Detmar, Muller, & Aaronson, 2007; Heinisch & Jex, 1998), and when considering personal and cognitive variables

observer and self-report may correlate only weakly or not at all (Mayer, 2004). Based on these arguments, all components of the tested model used players' reported perceptions (i.e., of the supportive environment, of their own need satisfaction, and of their training behaviour).

Procedure

Initial contact was made via a letter or an e-mail sent to clubs or teams, followed by telephone discussions to arrange testing. Prior to informed consent being obtained, each player and coach received an information sheet stating the general purpose of the study and explaining the procedure and their rights. Players were also given a verbal introduction to the study prior to the training session, and it was reiterated that there was no obligation to participate, and that the club and coaches would not be given any of their individual data. This was particularly important in a setting where players were accustomed to being assessed for the purposes of the club, or for selection.

Once agreement to participate had been obtained, participants completed a questionnaire pack prior to, and immediately following a typical training session. The investigator was available to assist with any queries throughout. Participants were instructed to complete the questionnaires as accurately as possible, ensuring that they completed every question. The first questionnaire pack contained demographic questions establishing age, gender, competitive level, and length of time in the sport. In addition, participants completed a number of questionnaires pertaining to a different study. Training sessions were then observed and coaches' behaviour rated. However, not all the clubs who participated were willing to have training sessions observed (i.e., some restricted access to merely completing questionnaires with the players pre- and post-training; four clubs allowed training to be observed), and so in

some cases these data were missing. Following training, players completed measures of coaches' need support in that session, in-session need satisfaction, their use of informational and controlling self-talk, and their in-session training behaviours. Post-training coaches were asked to rate players' training behaviours. Within a week of data collection, an initial feedback report was sent to the club. This contained information regarding the squad means and provisional findings (see Appendix H). *Analysis*

The theoretical model was tested using partial least squares (PLS) analysis, using the SmartPLS Version 2.0 (M3) software (Ringle, Wende, & Wills, 2006). PLS is an approach to structural modelling that uses a least-squares estimation procedure. PLS, or variance based structural equation modelling (SEM), is becoming widely used in preference to the more traditional covariance based SEM approach (Reinartz, Haenlein, & Henseler, 2009). Covariance based SEM relies on a number of assumptions, such as normally distributed indicators and a sufficient sample size of typically at least 200 observations (Boomsma & Hoogland, 2001). Monte Carlo simulations have provided evidence to support the utility of PLS to generate significant results at small sample sizes (e.g., Chin & Newsted, 1999), and it has been argued that it is beneficial for testing models that involve a series of cause-and-effect relationships between latent variables (Gustafsson & Johnson, 2004).

To summarise, a PLS approach was chosen in the present study as sample size is not constrained by the number of product indicators (Chin, Marcolin, & Newsted, 2001), whereas covariance-based approaches (e.g., LISREL) typically require n's greater than 200, and as such PLS is suitable for use with small sample sizes (Chin, 1998). PLS also allows specification of formative latent variables when relevant. For example, it was possible to specify need support as a higher order variable with the

formative indicators autonomy support, structure, and involvement. Need support was conceptualised as formative as the three indicators are independent factors (Ryan, 1991), that together create the need supportive environment. PLS takes into account the differing weightings of scale items when calculating structural models, and as such it accounts for measurement error in a way that traditional regression techniques fail to. Finally, it has been suggested that PLS should be preferred to covariance-based SEM techniques when the emphasis of a study is on theory development, as the statistical power of PLS is always larger (Reinartz et al., 2009).

Prior to testing the structural model, the measurement model was examined using item loadings and internal consistencies of each scale. Items with significant loadings > .30 were retained, with values below .3 considered to be low (Portney & Watkins, 2000). Internal reliability was assessed by composite reliability (CR). CR is a measure of reliability which takes into account different item loadings, and as such was used in preference to Cronbach's alpha which has been shown to over- or underestimate scale reliability (Raykov, 1998). A CR of .70 or higher was considered acceptable (Fornell & Larcker, 1981). In addition, the convergent and discriminant validity of the scales were tested by examining the average variance extracted (AVE). AVE refers to the amount of shared or common variance in a latent variable, that is, that variance explained by the latent variable relative to the amount of variance due to measurement error (Dillon & Goldstein, 1984). If the AVE is greater than .5, this indicates that the factor explains more than 50% of the variance in its items, suggesting that the items have convergent validity (Fornell & Larcker, 1981). Discriminant validity among latent variables is shown if the square root of the AVE is greater than the correlation between a latent variable and the other latent variables in the model (Gefen, Straub, & Boudreau, 2000), as this indicates that the latent

variables share more variance with their indicators than variance shared with other latent variables.

Following modifications made as a result of examining the measurement model, the structural model was assessed. Need support was specified as a higher order formative latent variable with autonomy support, structure, and involvement as its lower-order indicators. All other latent variables were specified as reflective. Standardized path coefficients (β) and the variance explained in the endogenous latent variables (R^2) were examined. PLS does not provide tests of significance of the R^2 s. Consequently the strength of the effects were assessed by calculating the effect sizes of the R^2 values (Cohen's f^2), using the following formula: $f^2 = R^2 / (1 - R^2)$. According to Cohen (1988) effect size values of .02, .15, and .35 may be viewed as an estimate of whether a predictor has a small, medium, or large effect respectively.

PLS estimates standard errors, and thus the significance of parameter estimates, via resampling procedures (Chin, 1998). In the present analyses 5000 bootstrap samples with replacement were requested. Bootstrapping through resampling (Efron, 1979) involves drawing repeated random samples with replacement from a given data set. Estimating parameters for each sample allows for the estimation of the distribution, and to develop confidence intervals for the estimates. It has been suggested that bootstrapping is useful when sample size is small (as in the present study), as it may help compensate for distortions in the specific sample relative to the general population (Adèr, Mellenbergh, & Hand, 2008).

Where there were significant indirect pathways, tests of mediation were conducted. For example, the mediating role of informational self-talk on the effects of need support on competence was examined. In line with the procedures outlined by Baron and Kenny (1986), full mediation was said to be present when a significant

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direct effect between a predictor variable and the dependent variable (C path) becomes nonsignificant when the effects of the mediator are controlled for (C' path). A product of coefficients method was used to test the significance of indirect effects (cf. Holbert & Stephenson, 2003). Full mediation was determined to be present if the indirect effect was greater than zero, and if the significant direct effect between the independent variable and the dependent variable became nonsignificant when the mediator was controlled for. Partial mediation occurred when the direct effect was substantially reduced but remained significant (Baron & Kenny, 1986). The ratio of the indirect effects to the direct effects (P_M) is also reported to provide an indication of the strength of the mediation effect (Shrout & Bolger, 2002). This allows examination of the proportion of the total effect mediated by each indirect process. Caution must be expressed when considering these ratios, however, as P_M has been reported to require large samples (e.g., > 500) to obtain sufficiently small standard errors (MacKinnon, Warsi, & Dwyer, 1995).

Results

Measurement Model

Descriptives, reliability estimates, and inter-scale correlations are shown in Tables 1, 2, and 3 below. The three need support components were moderately to strongly significantly positively correlated (*r*s ranged from .64 to .86). All three dimensions loaded highly on need support (factors loadings were .86 [autonomy], .86 [structure], and .96 [involvement]).

Initial item analyses showed that six items had nonsignificicant factor loadings (see Table 2 for item loadings). Three of these were below the criterion stated above. One item was removed from the concentration subscale. Three of the additional low loading items were part of the negative behaviours subscale, which also did not meet

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the criteria for an acceptable model fit (i.e., an unacceptable CR and AVE). On further reflection and analysis of the item content, it was felt that due to the composition and assessment of this subscale it was by nature formative rather than reflective. For example, three different negative behaviours are measured, which could vary independently of each other. In addition, the item "I was told off" is an indirect measure of negative behaviour (i.e., it refers to the coaches' response to a player's negative behaviour). Due to these issues negative behaviour was re-specified as a formative scale for structural testing. Lastly, one item in the controlling self-talk subscale was low loading (made me feel I had no control over the situation). Considering that the CR of the full four-item scale was acceptable, and that removing this item would reduce the content validity of the scale, the item was retained at this stage.

When considering convergent validity, the AVE of most subscales was greater than .50, suggesting that these indicator variables demonstrated adequate convergence. Informational self-talk, controlling self-talk, concentration, and autonomy had AVEs of < .50, suggesting that there may be problems with convergent validity in these factors. With regards to discriminant validity, when the square root of AVEs was compared to correlations between latent variables, with one exception the AVEs were higher, indicating that most variables had acceptable discriminant validity. Structure and involvement did not demonstrate acceptable discriminant validity with each other ($\sqrt{AVE}_{structure} = .712$; $\sqrt{AVE}_{involvement} = .766$; r = .861).

As described earlier, in addition to players' self-report data, a number of additional measures were taken of player and coach behaviour. Coaches were asked to rate players' training behaviour, and the correlations between these and players' self-ratings are shown in Table 4 below. Only the coaches' ratings of players' concentration were significantly correlated with players' self-ratings, and overall inter-correlations were low. Observer ratings of coaches and players' ratings of coach support were strongly correlated for autonomy support (r = .676) and structure (r = 732), and weakly correlated for involvement (r = .286). Although player and observer ratings of coaches' behaviours for all three need support facets were positively correlated, these did not reach significance, perhaps due to the relatively low number of coaches observed (n = 4).

Measure	Subscale	Mean	SD.	AVE	ρ
Coach	Autonomy Support	3.878	.631	.551	.859
Support	Structure	3.849	.571	.507	.836
	Involvement	3.682	.595	.586	.875
ICSTQ	Informational Self-talk	3.464	.602	.468	.858
	Controlling Self-talk	2.581	.619	.399	.710
Need	Autonomy	3.557	.589	.464	.693
Satisfaction	Competence	3.537	.611	.582	.871
	Relatedness	3.714	.708	.701	.921
Training	Effort	5.962	.711	.627	.893
Behaviours	Self Improvement	4.182	1.049	.583	.797
	Concentration	5.223	.728	.435	.784
	Negative Behaviour	2.270	1.018		
AVE = Average	Variance Extracted: 0 -	Composit	v nali ability		

Table 1: Subscale Means, Standard deviations and Reliability estimates.

AVE = Average Variance Extracted; ρ = Composite reliability

	PLS	Bootstrap
Factors and Items	Estimate	Estimate
Autonomy Support	ж	
Encouraged me to make choices	.731***	.728***
Helped me feel free to make decisions	.824***	.823***
Provided me with choices and options	.764***	.761***
Considered my personal needs	.628***	.623***
Encouraged me to take my own initiative	.763***	.763***
Structure		
Gave me clear and understandable instructions	.687***	.661***
Made it clear what I needed to do	.725***	.711***
Gave me good advice	.789***	.781***
Provided clear feedback about my progress	.708***	.715***
Helped me to feel confident	.693***	.698***
Involvement		
Was concerned about my wellbeing	.549***	.550***
Cared about me	.748***	.752***
Tried to involve me	.593***	.591***
Looked after me	.762***	.761***
Took into account my individual needs	.707***	.705***
Informational self-talk		
Made me feel I was in control	.746***	.738***
Was encouraging	.554***	.553***
Made me feel more in charge	.751***	.739***
Assisted my understanding	.734***	.730***
Provided me with positive feedback	.541***	.532***
Helped reduce the pressure I put on myself	.616***	.601***
Reassured me that I was in control	.805***	.791***
Controlling self-talk		
Made me feel pressured	.950***	.686***
Made me feel I had no choices	.385*	.466*
Was critical	.522**	.365**

Table 2: Measurement Model Factor Loadings

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	PLS	Bootstrap
Factors and Items (cont.)	Estimate	Estimate
Made me feel I had no control over the situation	.234	.216
Autonomy		
That my choices were based on my true interests and values	.676**	.567**
Free to do things my own way	.765***	.686***
That my choices expressed my 'true self'	.594**	.511**
Competence		
I was pretty good	.845***	.821***
I did pretty well, compared to other players	.829***	.821***
After working for a while, I felt pretty competent	.508***	.514***
I was satisfied with my performance	.853***	.847***
I was pretty skilled	.725***	.712***
Relatedness		
Supported	.829***	.828***
Listened to	.875***	.874***
Valued	.892***	.890***
Understood	.911***	.911***
Safe	.657***	.650***
Effort		
I put maximal effort into the training session	.863***	.847***
I completed all drills and workouts to a high standard	.778***	.758***
I put as much effort into the session as possible	.688***	.695***
I put in 100% effort throughout the session	.829***	.801***
I was totally committed to working hard in the session.	.782***	.759***
Self Improvement		
I answered questions from the coach	.529***	.491***
I asked the coach how I could improve my performance	.751***	.695***
I evaluated how well I was performing	.333	.276
I asked the coach how I could get better	.895***	.849***
Concentration		
I had to ask for instructions to be repeated because I didn't listen	.010	.127
I found it difficult to stay focused during the session	.559*	.489*
I was easily distracted during the session	.543*	.543*

3	PLS	Bootstrap
Factors and Items(cont.)	Estimate	Estimate
I listened carefully to the coach during training	.576*	.483*
I felt my mind wander during the session	.836**	.709**
Negative Behaviour		
I misbehaved during the session	.104	.042
I moaned during the session	.363	.328
I was told off during the session	.725*	.497*
I distracted others during training	.351	.075
<i>Loadings significant at:</i> $p \le .05$; $p \le .01$; $p \le .01$; $p \le .001$		

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Table 4: Bivariate correlations between coach and players ratings of players'

training behaviour.

	Player Ratings						
	Effort	Seeking	Concentration	Negative			
Coach Ratings		Improvement		Behaviour			
Effort	.167	.021	.146	086			
Self Improvement	002	024	.330**	262*			
Concentration	.104	041	.262*	114			
Negative Behaviour	011	.069	083	010			
* $p \le .05$; ** $p \le .001$							

Table 3. Latent Varia	ible Intercorrelations
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	Autonomy support	2	3	4	5	6	7	8	9	10	11
2. Structure	.641***										
3. Involvement	.686***	.861***	-								
4. Informational self-talk	.216*	.283**	.397***	-							
5. Controlling self-talk	242*	306***	330****	185	-						
6. Autonomy	.240*	.148	.279***	.310***	012	-					
7. Competence	.023	105	078	.248*	191	.070	-				
8. Relatedness	.420***	.516***	.593***	.284**	170	.407***	.138	-			
9. Effort	.247*	.101	.193	.170	152	.163	.366***	.292**	-		
10. Self-Improvement	.330***	.363***	.395***	.125	059	.304***	118	.349***	012	-	
11. Concentration	.096	.171	.140	.162	246*	061	.350***	.115	.411***	198	-
12. Negative behaviours	233*	335**	273***	019	.221*	131	.140	407***	.206*	173	.155
* $p \le .05$; ** $p \le .01$; ***	$p \le .001$										

Initial		PLS	Bootstrap	
Pathways		Estimate	Estimate	SE
Need Support	IST	.353**	.365**	.109
	CST	308*	308*	.158
	Autonomy	.278*	.278*	.128
	Competence	047	042	.140
	Relatedness	.572***	.573***	.081
IST	Autonomy	.248	.245	.186
	Competence	.277*	.288*	.118
	Relatedness	.095	.116	.107
CST	Autonomy	.086	.039	.191
	Competence	230	201	.165
	Relatedness	058	066	.192
Autonomy	Effort	.043	.032	.139
	Self Improvement	.211	.222	.158
	Concentration	144	132	.187
	Negative Behaviour	.027	.001	.162
Competence	Effort	.327*	.350*	.149
	Self Improvement	165	162	.164
	Concentration	.347	.331	.192
	Negative Behaviour	.197	.127	.247
Relatedness	Effort	.225	.220	.138
	Self Improvement	.277*	.267*	.148
	Concentration	.126	.103	.159
	Negative Behaviour	445	289	.362
* $p \le .05$; ** $p \le$	(.01; *** p < .001)			

Table 5: Initial PLS and bootstrapped pathway estimates.

Structural Model

Initial analyses showed that several of the structural paths were nonsignificant; initial estimates are shown in Table 5 above. These paths were eliminated and the model re-estimated, with the resulting estimates shown in Figure 1. Need support was positively associated with informational self-talk, and negatively associated with controlling self-talk. Need support was also positively associated with autonomy and relatedness. Informational self-talk was positively associated with competence. Competence was positively associated with effort, and relatedness was positively associated with self improvement.

The model explained between 10% and 34% of the variance in the dependent variables. R^2 s were .134 [autonomy], .127 [competence], .339 [relatedness], .125 [informational self-talk], .095 [controlling self-talk], .196 [effort], .175 [self improvement], .144 [concentration], and .205 [negative behaviour]. Cohen's f^2 showed that these effect sizes were large for relatedness (f^2 = .793), medium for self improvement and effort (f^2 = .217 and .171 respectively), and small for informational self-talk (.145), controlling self-talk (.117), autonomy (.087), and competence (.092). *Mediating Effects*

Table 6 shows the indirect effects and tests of mediation. Need support had an indirect effect on self improvement, however, this was not mediated by relatedness. As the indirect relationship between need support and competence was approaching significance (t = 1.91), the mediating role of informational self-talk on this relationship was also tested. However, no significant mediating effects were identified. Lastly, an indirect effect of informational self-talk on effort was approaching significance (t = 1.518), so the mediating role of relatedness on this relationship was tested. Again, no significant mediating effects were identified.

		Indirec	t Effect	Direct Effect (CDirect effect controllingpath)for mediator(s) (C' path)		Direct effect controlling		Effect ratio
						(C' path)		
From	То	β	t	β	t	β	t	
Need Support	Competence	.090	1.910	144	.657	064	.421	.054
Need Support	Self Improvement	.223**	3.290	.469**	7.023	.470**	6.550	.475
Informational Self-talk	Effort	.104	1.518	.339	1.663	.253	1.619	.307





N.B. Path figures are standardized bootstrap estimates; **p < .01, ***p < .001; Observed variables are not depicted for clarity.

Discussion

The aim of the present study was to examine associations between need support, self-talk, and need satisfaction, and in turn associations between need satisfaction and athletes' training behaviours. First, a measurement model was tested to examine the reliability and validity of the tools used. This was of particular interest given the use of novel questionnaires developed within this thesis. The current study provides some further support for the psychometric properties of the state training behaviours questionnaire and the informational and controlling self-talk questionnaire (i.e., adequate factor loadings and acceptable discriminant validity demonstrated between subscales). The differential associations of informational and controlling self-talk with outcome variables, and the small, nonsignificant correlation between the two, provides further support for the notion that informational and controlling aspects of an event constitute two distinct factors. There were, however, some important issues to consider. Although it demonstrated acceptable reliability, the loadings of the controlling self-talk subscale were relatively low, and it demonstrated poor predictive ability.

Based on Deci and Ryan's (1985) conceptualisation of controlling events as those which undermine feelings of autonomy, it is perhaps not surprising that no significant association was found between controlling self-talk and relatedness (given that definitions of controlling events are those which undermine autonomy specifically). It is also worth noting that the associations between controlling self-talk and both negative behaviour and concentration approached significance and were in the expected direction (i.e., controlling self-talk was associated with impaired concentration and more negative behaviour). However, the lack of predictive validity of the controlling self-talk scale in line with hypotheses was also evidenced in Chapter

5. Taking these findings together, it is possible that the controlling self-talk subscale needs further refinement.

An alternative explanation for the lack of significant pathways between controlling self-talk and need satisfaction is that the negative influence of controlling self-talk emerges only under less favourable environmental conditions. This is consistent with Oliver et al.'s (2010) findings that controlling self-talk interacted with students' experience of a lecture, and that only when students had a negative experience was the level of controlling self-talk related to increased negative affect and anxiety. Further development work needs to be conducted to examine whether the predictive validity of self-talk dimensions is improved if the functional significance of self-talk is conceptualised as three separate factors (i.e., informational, controlling, amotivational), or whether its effects are dependent on environmental conditions in other contexts.

With regards to structural pathways, in line with hypotheses, need support positively predicted informational self-talk, negatively predicted controlling self-talk, and was positively associated with both autonomy and relatedness. Informational self-talk positively predicted competence, with competence positively associated with effort. Lastly relatedness positively predicted self improvement.

The positive associations between need support and satisfaction of autonomy and relatedness are aligned with previous theorising and research (e.g., Deci & Ryan, 2000; Gangé et al., 2003). Furthermore, present findings that perceptions of need support predict the use of more informational self-talk, and less controlling self-talk, build on previous research (e.g., Burnett, 1999) which demonstrates that the socialcontextual environment can affect individuals' cognitions and utterances. The findings are in alignment with the results of Oliver et al. (2008), in that autonomysupportive environments promote the use of more informational type of self-talk. In addition, these associations suggest that athletes might model their self-talk from their social surroundings, consistent with models of linguistic acquisition and use (e.g., Tomasello, 2003).

In contrast to past research examining need support and need satisfaction within sport (e.g., Reinboth, Duda, & Ntoumanis, 2004), in the present study the pathway between need support and competence did not reach significance. This also contradicts findings that athletes whose coaches offer greater praise, information, and encouragement report greater perceived competence and satisfaction (Allen & Howe, 1998). This finding may be explained with reference to the nature of the participants sampled. All players were of an elite level for their age, and presumably would have developed conceptualisations of their competence over the duration of their playing careers as a result of playing experiences, selections, and feedback from a number of coaches. It is possible that need support for competence during a one-off training session has limited influence regarding their feelings of competence, or that a coach's behaviour has less impact on player's feelings of competence at this level than it might do at an earlier stage of their development. It was also noted from observations that coaches predominantly used competence enhancing or protective feedback following player error (e.g., "Come on, you can do that"). Although speculative, it may be that the actual experience of making an error was more salient in terms of competence than the coach's behaviour. Contextually, given that players are effectively competing for one or two professional contracts at the end of their academy careers, social comparison with teammates may have a stronger impact on competence than coach feedback.

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In addition, it is worth noting that in the present study competence was the sole need to be predicted by informational self-talk. It is possible that the functional significance of an individuals' self-talk is more closely associated with competence than a coach's need support, as this may demonstrate that the individual confirms and accepts the externally provided judgement/indicators of their competence. For example, if a coach provided high levels of competence support, but an individual perceived themselves to be training poorly and so did not reinforce this positive competence feedback internally through their self-talk, it might be expected that competence would not be influenced.

Contrary to expected findings, informational self-talk did not predict autonomy. Correlations between the latent variables indicated that informational selftalk and autonomy were significantly correlated, and the structural pathway was approaching significance. It is possible that the strength of the relationship between need support and autonomy rendered the pathway nonsignificant. This could have been compounded by the weakness of the autonomy subscale in terms of its item loadings and reliability. This is unlikely, however, given that autonomy was still related to need support in the manner hypothesised. It is of some concern that neither informational nor controlling self-talk impacted upon autonomy, perhaps suggesting that further refinement of the measurement tool is required to accurately distinguish between self-pressurising versus self-supporting self-talk. It has to be considered, however, that it is possible that informational self-talk does not impact upon autonomy in the manner hypothesised. It may be that the way in which we regulate our behaviour through inner speech has limited effect on feelings of autonomy relative to the impact of the external environment.

When considering the findings relating to training behaviours, the significant pathways between competence and effort, and relatedness and self improvement are consistent with hypotheses based on previous literature. Specifically, the positive pathway between competence and effort is aligned with research and theory which suggests that perceived competence or ability is predictive of the amount of effort an individual will invest in a given task (e.g., Bandura, 1997). The importance of competence satisfaction for positive athlete-oriented outcomes is widely reported (e.g., Reinboth et al., 2004). Moreover, in research examining physical activity, Williams and Gill (1995) have shown that perceived competence positively predicted effort (behavioural intensity and persistence) both directly and indirectly (through increased intrinsic interest in physical activity). Although the effect of competence on effort has been previously established, to the author's knowledge the findings of the present study are novel in terms of highlighting this association within a field-based athletic training context.

The observed association between relatedness and self improvement can be explained in terms of the quality of the relationship between the coach and player. The items involved in the self improvement subscale show an active engagement in the training process. They explicitly refer to coach-player communications, such as asking and answering questions during the session, as well as seeking feedback from the coach. Previous researchers have suggested that the quality or compatibility of coach-athlete relationships is positively related to a number of desirable outcomes, including enhanced communication and in turn, performance effectiveness (e.g., Chelladurai & Carron, 1978). In addition, athletes' ratings of coach empathy, which might be expected to impact on feelings of 'closeness' or being 'listened to', have been associated with greater athlete satisfaction (Lorimer & Jowett, 2009), and with

lower feelings of exhaustion, devaluation, and withdrawal (Vealey, Armstrong, Comar, & Greenleaf, 1998). It is likely that athletes feel more able to ask questions and interact with the coach regarding their performance when they are more assured of the strength of the relationship. Conversely, athletes who do not experience support for relatedness may be more likely to withdraw and to engage less in training.

The emergence of a significant indirect effect of need support on self improvement, which was not mediated by relatedness, was not hypothesised. A possible explanation that the effect of need support on self improvement is mediated by its combined impact upon need satisfaction generally, rather than solely through relatedness, is not supported by the data. Instead, need support may be positively associated with self improvement as a need supportive coach may be perceived as being available or receptive to communication, resulting in the athlete being more likely to approach them. For example, if a coach offers feedback (supporting competence), or asks athletes for their input on drills (supporting autonomy), this may make them seem more approachable and increase the likelihood of their athletes seeking information from them. This could be independent of changes in the athletes' feelings of relatedness.

Despite two significant pathways predicting effort and self improvement, of the structural paths involving training behaviours the majority tested were nonsignificant. Autonomy, competence, and relatedness were unrelated to concentration or to negative behaviour, with only one need predicting effort and self improvement in each case. This suggests that consideration of other factors that may contribute to determining athletes' training behaviour is warranted. For example, pretraining fatigue may be relevant, as subjective fatigue is associated with impaired concentration and drowsiness (Yoshitake, 1978). Alternatively, the lack of significant predictors of training behaviours may indicate problems with the validity of the measure. The construct validity of the training behaviours scales (i.e., that it accurately represents reality) may have been compromised by self-report biases.

The limitations of self-report measures have been widely debated in previous literature. Common criticisms include their susceptibility to self-presentational biases in line with socially desirable characteristics (e.g., Spector, 1992), and it has been argued that because self-report responses are a product of psychological, sociological, linguistic, experiential and contextual variables, it is difficult to be clear on precisely what is being measured when using them (Razavi, 2001). Research that has examined the accuracy of self-report measures has indicated that individuals may have a limited ability to accurately self-assess their own competencies and behaviours (e.g., Davis et al., 2006). In the present study, this may have been compounded by the need for the players to focus on technique, instructions, and completing the session to the best of their ability. Research has indicated that completing multiple tasks, or more demanding tasks, can impair recall accuracy (e.g., Stangor & Duan, 1991). While self-report is appropriate for measuring perceptual variables (Spector, 1994), it may not be the most accurate method of measuring behaviour. Future studies should consider adopting more in-depth observational measures of players' training behaviour, or using objective data (e.g., heart rate, accelerometers, performance analysis software) to cross-check the validity of players' self-ratings. Using more objective measures may provide more accurate data regarding the antecedents of players' training behaviour.

When examining players' self-report ratings of training behaviour, it is also of interest to note that correlations between players' and coaches' ratings of players' training behaviour were low. In previous sport-based research, correlations between

player ratings and coach ratings have typically been moderate (e.g., Woodman et al., 2010). However, as previously noted, studies comparing observer and self-ratings in other domains have shown a broad discrepancy in terms of strength of correlations (e.g., Heinisch & Jex, 1998; Hilarius, Kloeg, Detmar, Muller, & Aaronson, 2007). The lack of strong correlations in the present study emphasises that how a coach is able to perceive a players' training behaviour, and how the player perceives themselves to be training, are different constructs. The reason for the scale of the discrepancy however is unclear, as previous research has indicated that observer and self-report ratings of exertion or effort are highly correlated (Ljunggren, 1986).

Despite the aforementioned problems with the players' self-report data, retrospective justification for using players' ratings in the model tested can be drawn from observation that there was very little variation in coaches' ratings across their squad. Coaches may have been unable to accurately distinguish between the training behaviour of individual players within their squad. This may be explained by the typical use of several coaches in a session, who often took responsibility for different sections of the session (e.g., warming up, skills) or for players in different positions (e.g., goalkeepers). In this way, it is understandable how coaches may not accurately score each player. It was also noted that there tended to be one or two players who scored higher and lower, respectively, than the rest of the team (who were scored similarly). This suggests that coaches observed and recalled only the players who had 'stood out' from the rest, which is aligned with teaching-based research on the difficulties of accurately rating pupils' achievement and motivation (e.g., Hoge & Butcher, 1984). If these assumptions regarding the inability of coaches to perceive players' training behaviour are robust, it could be argued that providing coaches with greater information regarding how players train, whether using self-report,

observational, or objective tracking measures, is likely to be beneficial and to assist their understanding of how their players are behaving in this context.

Taken together, the relative lack of significant pathways associated with players' training behaviours, and the low correlations between coach and player ratings, raise serious questions as to whether the self-ratings obtained from players in this study provided accurate representations of the factors they aimed to measure. This is not only applicable to the self-report training behaviours, but also when considering how accurately players are able to rate coaches' need supportive behaviours. Using subordinates to rate leader behaviours has been criticised by previous researchers, with Vroom and Mann (1960) raising serious doubts concerning the extent to which leader behaviour can be inferred from the perceptions of their subordinates. Other confounding variables, such as coach-athlete compatibility, have been shown to influence athletes' perceptions of coaching behaviour (Kenow & Williams, 1999), and with regards to support, perceived support has been shown to share as little as 20% common variance with actual received support (Rees & Freeman, 2007). In the present study, although the observer's rating of coach behaviour were not significantly correlated with players' ratings, the value and direction of the correlations between observed and rated behaviours was high, and each behaviour was more highly correlated with its corresponding rating than with ratings of other behaviours. It is therefore suggested that the nonsignificance may be as a result of a lack of power, particularly given that not all the clubs who participated were willing to have training sessions observed (see comment in methods).

There remain a number of limitations to the present study, and areas for future research to address. First, although this chapter presents and discusses pathways in terms of directional relationships, cross-sectional data can be used to infer causality

Chapter 6: Self-talk and training behaviours.

(in that if there is a causal relationship between variables they should be related), but not to test it. In addition, correlations between variables measured at the same time using similar measuring techniques are susceptible to common method bias (cf. Podsakoff, MacKenzie, Podsakoff, & Lee, 2003), although in the present study the AVEs suggested this was not problematic. Future studies can reduce the likelihood of this occurring by temporally separating measurement of criterion and predictor variables, for example, by measuring players' perceptions of need support at start of season, and training behaviour mid-season. Additionally, experimental studies manipulating need support or assigning self-talk may provide clearer evidence regarding the effects of these variables on both need satisfaction and training behaviour.

Due to difficulties in obtaining access to elite youngsters, who are viewed as assets to their clubs and protected as such, the sample size was small compared to the total number of current professional youth soccer players. Given that there are 92 clubs in the professional English football leagues (from Premier League to League 2), the *n* represents a sample of only one player per club on average. Furthermore, the sample consisted predominantly of British Caucasian athletes, and the sport sampled possesses common characteristics, which should be considered when generalising findings to other contexts. In addition, it is possible that there may have been a sampling bias, with clubs that provide players with more autonomy support and freedom being more likely to engage in research and allow players to participate, with more controlling clubs refusing researchers access.

In the current study, need support was measured with respect to the coaches' behaviour only. Research in other contexts has highlighted that need support may be provided from multiple sources, including parents or higher management /

administration (e.g., Vallerand, Fortier, & Guay, 1997). In a highly structured business environment such as an elite football club, support may be given to players by a range of individuals including medical staff, managers, coaches, etcetera. Exploring where players receive support from, and their perceptions of the overall need supportive climate of their club, might provide a more thorough representation of the effects of need support on player behaviour. In addition, as relatedness was measured with respect to 'coaches and teammates', it may be pertinent to explore further the role of teammate-provided need support on need satisfaction.

To summarise, the present study provides some support for a model in which the need support provided by coaches is associated with both need satisfaction and the functional significance of players' self-talk. It also highlights the importance of the functional significance of self-talk for satisfaction of feelings of competence. In turn, need satisfaction was positively linked with desirable training behaviours, which provides further evidence of the benefits of need supportive environments for optimal athlete outcomes.

CHAPTER 7

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GENERAL DISCUSSION.

Overview of the thesis

This thesis had three main aims. First, to extend self-talk research by examining its antecedents and effects in the context of a contemporary motivational theory. Second, to test a self-determination theory (SDT)-based model in which self-talk is a component of athletes' experience of the motivational environment in sport. The final aim of this thesis was to develop an understanding of athletes' behaviour in the training environment and the impact of self-talk on psychological need satisfaction and training behaviours. In order to achieve these aims, Chapter 2 examined the effects of autonomy-supportive versus controlling environments on individuals' self-talk; Chapters 3,4, and 5 developed measures of informational and controlling self-talk and athlete training behaviours; Chapter 3 explored the relationships between the two types of self-talk and affect; Chapter 6 investigated the relationships between psychological need support, self-talk, need satisfaction and behavioural outcomes in a high performance sports setting.

The main findings of the thesis were: (1) evidence was provided that self-talk can be meaningfully differentiated into informational and controlling components; (2) the degree to which the environment supports basic needs is related to the content and functional significance of self-talk; (3) the functional significance of self-talk is associated with a number of affective and behavioural outcomes; specifically, informational self-talk is associated with more desirable outcomes; (4) athletes' need satisfaction is predictive of their training behaviours; and (5) that examining the antecedents and consequences of how one experiences one's self-talk (i.e., its functional significance) in the context of SDT appears promising.

Main findings and theoretical advancements made by the thesis

Evidence was provided to support the proposition of cognitive evaluation theory (CET: Deci & Ryan, 1985) that there is a meaningful distinction between internally informational regulating episodes, experienced as free from pressures, and internally controlling regulation in which the individual pressurises themselves to act (Ryan, 1982, 1991). It was demonstrated for the first time that individuals' self-talk can be considered as an internal event with informational and controlling aspects. Consistent findings of small nonsignificant correlations between the two dimensions, and differing patterns of predictive associations with other variables, support the independence of the informational and controlling self-talk dimensions. Chapters 3, 5, and 6 provided evidence that informational self-talk was associated with more positive affect, enhanced feelings of competence, and positive training behaviours including coping, effort, concentration, and self improvement. Controlling self-talk was associated with negative affect during less favourable conditions and with more negative behaviours during training.

Evidence was also provided to suggest that one's experience of the external sociocontextual environment is related to the functional significance of self-talk. Building on previous research showing that communication from others is associated with the valence of self-talk (e.g., Burnett, 1999), Chapters 2 and 6 showed that in a broader sense our perception of whether the environment is autonomy supportive or controlling is related to the nature of our inner speech. The experimental study in Chapter 2 identified that autonomy-supportive conditions result in the use of more positive, encouraging, and informational types of self-talk, with controlling conditions causing more negative, self-critical, and directive or forceful self-talk. Further support for these effects was provided by significant findings concerning

hypothesised pathways between need support and informational and controlling selftalk in Chapter 6.

The research presented in Chapter 6 also extended the literature by identifying associations between satisfaction of basic psychological needs, and task-related behaviour (e.g., effort). Specifically, satisfaction of competence and relatedness were associated with greater effort investment and athletes' self improvement-related behaviour during training sessions. This suggests that in addition to influencing whether or not individuals choose to engage and persist with a task (e.g., Pelletier, Fortier, Vallerand, & Brière, 2001), the quality of an individuals' behavioural engagement is predicted by their need satisfaction.

Overall, the series of studies in this thesis provides a basis for concluding that investigating the antecedents, nature, and effects of self-talk in the context of selfdetermination theory is promising. Examining self-talk in terms of its functional significance has both theoretical and empirical justification. Chapters 3, 5, and 6 support the conceptual distinction between informational and controlling aspects of self-talk, as well as providing evidence to support the predictive validity of the concepts in line with hypotheses based on SDT.

Methodological advancements made by the thesis

One of the main methodological advancements of the thesis relates to the development and initial validation of a tool designed to measure the functional significance of internal events to individuals. Chapters 3, 5, and 6 provide evidence to suggest that the informational and controlling self-talk questionnaire is a useful tool for measuring the functional significance of individuals' self-talk during a specified period of time (e.g., a lecture or a training session). The functional significance of internal events is an under-researched area within SDT, and it is hoped that the work

contained in this thesis will provide a foundation for further study of this topic by providing a tool with which to accurately measure these dimensions.

Other methodological advancements pertained to the development and psychometric validation of measures of athletes' training behaviours. State and trait self-report questionnaires were constructed based on factors identified by coaches as important for athlete development in Chapter 4. This qualitative study provided indepth data regarding coaches' views of important training behaviour, and provided a platform to develop a comprehensive measure possessing both ecological validity and applied relevance. The data presented in Chapters 5 and 6 suggests that athletes' behaviour during training sessions can be assessed and differentiated using these selfreport measures, and that the questionnaires possess adequate structural validity.

There were a number of additional examples of methodological advancements or rigour specific to individual studies. These include the modification of Markland and Tobin's (2010) need support scale for use with a sporting sample, the use of a partial least squares approach to data modelling in Chapter 6, and integration of a number of procedural and analytical elements, including consideration of the impact of social desirability on athletes' self-report of training behaviour and common method bias.

Strengths of the thesis

One of the major strengths of this thesis is the number of novel areas of research which were pursued: In particular; the examination of cognitive variables from a SDT perspective, the examination of the motivational environment as a precursor to self-talk, and differentiating and predicting athletes' behaviour in a training environment. This thesis attempts to deal with a number of criticisms of previous research, including limited theory-based research within the self-talk focused

sport-based literature (cf. Hardy, 2006), atheoretical conceptual and operational definitions of motivational self-talk, and difficulties in measuring and quantifying self-talk.

Furthermore, a strength of the thesis, which provides evidence of both an extensive programme of research training and a systematic detailed study of a specific topic, is the diverse methods of enquiry used throughout. These include laboratory experiments, cross-sectional questionnaire-based surveys, focus group interviews, and behavioural observation. Concurrent and retrospective methods of recording self-talk and behaviour were also employed. The multiple approaches to exploring self-talk reflect the difficulties associated with measuring individuals' self-directed speech (Meichenbaum & Butler, 1979; Ericsson & Simon, 1993), and a determination to gain an accurate insight into the nature of a phenomenon that is, by its very nature, predominantly private and covert. Furthermore, adopting different ways of recording and analyzing self-talk enabled triangulation of findings, as illustrated in Chapter 2. Combining methodological approaches in this way can add rigor, complexity, richness, and depth to a program of inquiry (Flick, 2002).

A further strength of the thesis is the variety of populations tested. For example, samples included undergraduate students, adult recreational and club athletes, highly skilled and experienced coaches, and elite professional youth athletes. In particular, testing and refining the measure of the functional significance of selftalk using both a sporting and non-sporting sample add credence to its relevance in multiple contexts.

Delimitations of the thesis

Delimitations reported here concern decisions made during the research process which affected the scope and focus of the thesis. Choosing to ground the entire thesis within the theoretical framework provided by SDT enabled detailed application of a contemporary and relevant theory, and subsequently a meaningful examination of the role of self-talk in motivation and behaviour. Consistency in terms of theoretical predictions enabled developmental lines of enquiry that retained a strong underlying rationale. However, it is acknowledged that drawing from multiple theories may have enabled a broader critique of how self-talk can be considered a motivational factor. For example, behaviourist theorists might suggest that self-talk acts as a positive or negative reinforcer of behaviour (cf. Skinner, 1983). Alternatively, self-talk may operate as a form of verbal persuasion affecting selfefficacy (Hardy, 2006), with subsequent motivational consequences (e.g., task choice, effort investment, and persistence; Bandura, 1997). The application of alternative theoretical frameworks to the study of self-talk is beyond the scope of the present thesis but would be useful for future research to explore.

It is also important to acknowledge that this thesis adopts an organismic (Goldstein, 1934) rather than mechanistic approach to human behaviour. That is, humans are perceived as active and volitional in terms of initiating and regulating behaviour (Deci & Ryan, 1985). Furthermore, the focus on individuals' perceptions of environments partially reflects the cognitive tradition which emphasises the role of cognitive processes in determining behavioural outcomes (e.g., Lewin, 1936). The cognitive view purports that individuals' information processing is mediated by the system of categories and concepts they possess, which form a representation of the environment in which they operate (Craik, 1943; De Mey, 1992). Adhering to a strictly cognitive approach focusing on computational models, however, may neglect the role of both emotion and consciousness in decision making and behaviour (Searle, 1992). As such, the present thesis espouses Thagard's (2006, 2009) multilevel
interactional approach, where reciprocal causal relations can exist between social, psychological, and neural phenomena. It is recognised that social factors may influence psychological constructs, and that psychological differences at the individual level may also influence the social environment. It is argued that embedding the current programme of research into cognitive and organismic paradigms was both appropriate given the concepts of interest (e.g., perceptions of autonomy, self-talk) and consistent with previous theoretical approaches to the study of cognition and behaviour (cf. De Mey, 2003).

Such approaches, however, assume that measuring cognitive processes using individuals' self-report (whether through questionnaires, thought listing, or thinkaloud paradigms) provides valid and meaningful data. It is acknowledged that this implicit assumption is the subject of some debate, with researchers continuing to argue whether or not self-report data can be considered reliable (e.g., Chan, 2008; Adams, Soumerai, Lomas, & Ross-Degnan, 1999). Whilst recognising this concern, it is argued that in this thesis the emergence of hypothesised effects, and limited evidence of social desirability issues, suggests that using self-report data enables some understanding of motivational processes. As discussed in Chapter 6, this does not mean that observational methods do not have a place in terms of the study of athletes' training, in fact quite the opposite. It is also worth considering whether alternative methods of sampling self-talk, such as signal-contingent reporting (e.g., Wheeler & Rice, 2006), or electronically activated recorders (e.g., Mehl, Vazire, Holleran, & Clark, 2010) may allow us to explore task-concurrent self-talk. Both methods could be used to sample self-talk over longer periods of time and in field based situations. Whilst acknowledging that the study of conscious processes is essentially subjective due to a reliance on individuals' self-report (Searle, 1992), continuing to refine

existing techniques as well as developing novel methods of assessing unobservable phenomena is recognised as vital to the scientific study of conscious thought, which has been argued to be "vacuous without introspective report, [and] intractably conflictual with it' (Hurlburt & Schwitzgebel, 2007, p.5).

It is acknowledged that a mixture of quantitative and qualitative approaches could, at times, be contradictory rather than complimentary. It is possible that 'dipping into' unfamiliar qualitative methods risks developing only a superficial understanding of the philosophy behind their application and use. As such, the application of these techniques can appear limited rather than a true exploration of their functional capacity. Recent research, however, has advocated adopting a pragmatic approach to method selection, which is driven by the research question and can combine both quantitative and qualitative techniques (Morgan, 2007). The use of qualitative methods to identify relevant variables to be studied, and generate research questions for future investigation, as in the present thesis, is widely promoted (e.g., Barbour, 1999; Sadelowski, 2000).

Lastly, although in this thesis the original focus was on self-talk as a psychological strategy used within applied sport psychology, its investigation was integrated firmly with mainstream psychological literature. It was argued by the author that when considering self-talk, the use of interdisciplinary approaches would be beneficial in the future. For example, as discussed in Chapter 1, self speech has received research attention in a wide variety of domains. These include developmental and educational psychology (e.g., Fernyhough, & Fradley, 2005; Burnett, 1999), counselling and clinical psychology (e.g., Nutt-Williams & Hill, 1996), philosophy (e.g., Hurlbert & Schwitzgebel, 2007), neuropsychology (e.g., Girbau, 2007), criminology (e.g., Topalli, 2005), and linguistics (e.g., Carruthers & Boucher, 1998). Exploring commonalities and areas for debate across these domains is likely to drive forward our understanding of the nature and role of self-talk. Similarly applying techniques from one domain into another may also help our understanding.

Key limitations of the thesis

There were a number of methodological or procedural limitations that affect the generalisation and utility of the findings. One major limitation of the thesis relates to the lack of an experimental study in which the use of informational and controlling self-talk is manipulated to examine its effects. This is an obvious direction for future study (see relevant section below), and indeed, ongoing work involving manipulation of informational and controlling self-talk has provided promising initial evidence that the effects are in line with directional models explored in the present thesis. It is also a limitation that need satisfaction was only measured in Chapter 6. This meant that although the associations between the functional significance of self-talk and affect or behaviour reported in prior chapters are attributed to a need satisfaction mechanism, this is only inference.

A further limitation applicable to the thesis as a whole is homogeneity regarding some characteristics of the samples used. Although samples were varied in terms of factors such as current vocation, all samples were obtained from a predominantly Caucasian population based in the United Kingdom. Apart from the focus group study in Chapter 4, all experimental samples had a mean age of between 16 and 25; this should be taken into consideration when generalising findings to other contexts or samples.

Ethical considerations

All studies in the thesis were conducted in accordance with the ethical guidelines of the School of Sport, Health and Exercise Sciences at Bangor University. In all instances, prior to data collection appropriate ethical clearance was obtained. The majority of the studies were relatively straightforward in terms of ethical issues; however, there were two that required additional thought and justification. The protocol in Chapter 2 required the use of deception, and Chapter 6 involved sampling 16 to 18 year old academy players.

Case law on consent within the UK requires that voluntary informed consent is obtained from all participants. That is, agreement should be free from coercion or undue influence, participants should be provided with and should understand all information about the study, and participants should be competent to make a rational and mature judgement regarding their participation (Homan, 1991). The study in Chapter 2 deliberately involved deception regarding the true purpose of the study and the function of recording equipment during testing, in order to obtain unbiased data regarding participants' free choice behaviour. Participants were aware that they were being recorded, however, they believed that this equipment was primarily focused on the computer screen to monitor performance rather than their behaviour. All participants gave consent for recording to take place, were fully debriefed and were given the opportunity to provide feedback at the culmination of testing. No participants reported any unease with the procedure.

With regards to the final stipulation for obtaining informed consent, that participants are competent to make a judgement regarding their participation, the age of 16 is considered to indicate acceptable competence in UK legal frameworks. However, Bangor University guidelines state that participants under the age of 18 are

considered to be children. Thus, in Chapter 6's sample of youth soccer players, an amended process for obtaining informed consent was used. Written informed consent for their participation was obtained through a 'gatekeeper', who was acting in *loco parentis*. This was either the team manager or coach, or the educational and development officer of the club. Following an explanation of the study, their rights, and the provision of an opportunity to ask any questions, written informed consent (legal) and assent (University guidelines) was also obtained from each player,

From a more reflective and anecdotal perspective, it was possible that during the data collection that athletes may have experienced feelings of compulsion when considering whether or not to take part in the study. For example, often the coaches and/or managerial staff were present when the study was being explained to players. This may have resulted in some players believing that their coaches wanted them to take part in this particular study, raising an obligation to comply. In order to attempt to alleviate any pressure, it was repeatedly emphasised that players did not have to take part, and coaches were not allowed to be present when the questionnaires were handed out and completed. Coaches provided rating data for all the players in the squad, regardless of whether all players had completed questionnaires. As such, coaching staff had no way of knowing which players had participated.

Applied Recommendations

The findings of this thesis can be used to justify a number of applied recommendations. First, individuals in supportive roles (e.g., coaches, teachers, parents etc.) should endeavour to promote the use of informational self-talk, and discourage the use of controlling self-talk (the latter in particular during a negative experience). Individuals (e.g., athletes, students) should attempt to use self-talk that emphasises their autonomy and is self-endorsed, in order to promote feelings of competence and facilitate self-determined functioning. Self-talk which directs or pressures individuals should be avoided. The findings of this thesis suggest that it is the functional significance of the self-talk, rather than the content per se, which is important in terms of determining outcomes. As such, coaches and athletes should be aware that, for example, negatively phrased self-talk may be adaptive if it is perceived as informational in nature. Coaches should also endeavour to provide need support to their athletes as this is likely to result in the use of more informational and less controlling self-talk, enhanced need satisfaction and subsequently more positive affect and a more positive approach to training.

It might also be worthwhile for athletes, coaches, and applied sport scientists to monitor training behaviour more effectively in terms of its quality. From an athlete's perspective this could allow them to develop at a faster rate. In other contexts (e.g., academia) it has been demonstrated that self-monitoring is an effective behavioural intervention when targeting engagement, productivity, and disruption (Rock, 2005). From a coach's perspective, monitoring training can provide early behavioural indicators of a non-optimally motivated or disengaged athlete; the framework developed in Chapters 4 and 5 helps to provide more structure for this monitoring process. This may be particularly important when considering training or workouts completed away from supervision as previous research with runners has shown poor correlations between prescribed and reported training (Hewson & Hopkins, 1995).

Another interesting issue to consider is the wider role of the organisational hierarchy of the academy, club, or governing body in general in terms of the need support provided, and the values and behaviours promoted. For example, Vallerand, Fortier, and Guay (1997) identified independent effects of need support from parents,

teachers and the school's administration on students' perceived autonomy. It is possible that there are multi-level effects in terms of the influence of perceived support not merely from coaches but from other individuals in positions of leadership within the organisation. This may apply even outside of academy settings; for example, need support provided by performance directors, as well as that provided by coaches, may be linked to athletes' need satisfaction.

Future directions

The nature and role of controlling self-talk. One issue arising from the thesis regards the clarification of the nature and role of controlling self-talk. Replicated correlations indicate that, aligned with Deci and Ryan's (1985) theoretical predictions, informational and controlling self-talk are separate constructs with differing spheres of influence. Whilst informational self-talk was associated with more positive affect and need satisfaction, associations between controlling self-talk and the outcome variables examined in the thesis were relatively weak. For example, in Chapter 5, correlations between controlling self-talk and training behaviours were predominantly nonsignificant, which was replicated in Chapter 6. In Chapter 6 controlling self-talk was associated with negative behaviour and concentration in the direction hypothesised; however, these correlations did not reach significance. An alternative explanation regarding the role of controlling self-talk is presented based on the findings of Chapter 3, in that the negative influence of controlling self-talk emerges only under less favourable environmental conditions. It is unclear, however, why the positive effects of informational self-talk should be universal, and controlling self-talk only important in less optimal environments.

Deci and Ryan's (1985) original conceptualisation of the functional significance of events refers to three aspects, namely informational, controlling and

amotivational aspects. Controlling events are defined as those which undermine feelings of autonomy, whereas amotivational events are those that promote feelings of incompetence, and hence result in a lack of motivation towards the task. The amotivational aspect was not included in the initial measure development for two reasons. First, it was felt that in the applied context of primary interest (elite sport) athletes were unlikely to display no motivation for task engagement. Second, the design drew from previous studies comparing informational/autonomy supportive versus controlling environments; amotivational environments were not typically considered as a distinct entity. Further development work should be conducted to examine whether the predictive validity of self-talk dimensions is improved if the functional significance of self-talk is conceptualised as three separate factors (i.e., informational, controlling, amotivational). For example, the controlling self-talk item relating to self-criticism may be more appropriate in a subscale assessing amotivational events. Alternatively, replication of interactive effects between controlling self-talk and environmental favourableness would provide stronger evidence that the effects of controlling self-talk are dependent on situational factors.

Exploring the moderating role of self-talk. In Chapter 2, evidence was presented to indicate that the socio-contextual environment affects one's self-talk. This is modelled in the remainder of the thesis as a sequential event; that is, that exposure to the environment causes subsequent self-talk. However, it is possible that the use of informational and controlling self-talk may be related to personal factors (e.g., personality, causality orientation) as well as influenced by perceptions of the environment. If this is the case, then the use of different types of self-talk may moderate the effects of how one experiences the environment. For example, if the environment is perceived as controlling, and an individual has a general tendency to

use informational self-talk, then the negative influence of the controlling environment may be reduced. Some evidence is provided in Chapter 3 that controlling self-talk moderates the associations between students' understanding or experience of the lecture, and affective-based outcomes (i.e., anxiety, and positive and negative affect). Further investigation is required to clarify whether self-talk may have a moderating effect in other contexts (e.g., sport) and on other outcomes (e.g., behaviour).

Need support and self-talk. In line with the propositions of SDT, Chapter 2 and Chapter 6 in this thesis demonstrated that need support was positively related to desirable outcomes, including informational self-talk, autonomy and relatedness, and negatively related to controlling self-talk.. It is suggested in Chapter 6 that these associations may indicate that athletes can model their self-talk from their social surroundings, consistent with models of linguistic acquisition and use (e.g., Tomasello, 2003). Although only relating to verbal communication, the effect of others' speech on self-talk has long been highlighted, with early work suggesting that imitation functions as "a method of absorbing what is present in others and making it over in a form peculiar to one's own temper and valuable to one's own genius" (Baldwin, 1895/1915, as cited in Valisiner & van der Veer, 2000, p.153). It is possible that over time the imitated phrasing becomes internalised and adopted as an individual's self-speech, with some researchers arguing that there may be a continuum between repetition and spontaneous language use (Speidel, 1989). This is merely speculative, however, as perceived autonomy support, rather than coaches' verbalisations, was the predictive variable measured. Nevertheless, autonomy support is itself largely expressed by verbal behaviours (e.g., Deci, Driver, Hotchkiss, Robbins, & Wilson, 1993).

Alternatively, it is possible to consider a controlling environment as one which 'primes' individuals to self-monitor and regulate in a controlling way, and a need supportive environment as one which primes informational and autonomy supportive self-regulation. Studies have identified effects of both subliminal and supraliminal primes on autonomous and controlling motivational states (e.g., Levesque & Pelletier, 2003), as well as subsequent use of defensive behaviours such as self-handicapping (Hodgins, Yacko, & Gottlieb, 2006). It is plausible that the functional significance of spontaneous self-talk may also be the result of environmental priming. The precise mechanism by which need supportive or thwarting environments influence our self-talk remains to be clarified.

Summary of future directions

A number of specific suggestions for future research directions have been highlighted throughout the various chapters of this thesis. From a more general perspective and with regard to self-talk, it is recommended that future studies should attempt to establish antecedents and effects using experimental or longitudinal designs. Furthermore, given that the interpretation of self-talk seems to be related to affect, and could be argued to be potentially important in terms of long-term wellbeing, further investigation into personal and situational antecedents of different types of self-talk is warranted. Consideration as to whether the functional significance of self-talk is influenced by person level variables, such as causality orientations, may have some merit. For example, do autonomous individuals use more informational and less controlling self-talk than controlled individuals? Research might also consider the application of models of personality (e.g., Costa & McCrae, 1996) to predict and explain the use of and effects of self-talk. For example, do individuals high in conscientiousness use more goal-directed informational self-talk than those

who are low in this trait; do narcissists use high levels of self-praising or self-focused self-talk; and does individuals' use of controlling self-talk mediate associations between neuroticism and anxiety?

With regards to training behaviours, in Chapter 4 coaches reported asking questions to stimulate learning, providing training diaries to encourage selfevaluation, and using critical feedback to enhance effort. Establishing causal links between coach behaviours and athlete training would provide a stronger rationale for amending coach behaviour in a training setting. Furthermore, given the emergence of positive associations between desired training behaviours and the use of psychological skills in Chapter 5 (e.g., effort with attentional control and positive self-talk), it would be of considerable interest to investigate whether the promotion of athletes' use of psychological skills would result in enhanced training engagement. Future research could also establish the relative importance of the training behaviours measured in terms of player development and progression. A longitudinal study monitoring players' behaviour during training, and their progression over time, may further develop our understanding of this issue. Lastly, continuation of the validation process related to the training behaviours measures in different samples and sports, and with observational and objective measures of players' training behaviour, is desirable. Concluding remarks

This thesis achieved its three main purposes. The first of these was to extend self-talk research by examining its antecedents and effects in the context of a contemporary motivational theory. Second, using self-determination theory as the framework, the aim was to test a model in which self-talk is a component of athletes' experience of the motivational environment in sport. The final aim of this thesis was

to develop an understanding of athletes' behaviour in the training environment and the impact of self-talk on psychological need satisfaction and training behaviours.

The literature is advanced by providing further evidence to support the propositions of self-determination theory regarding the benefits of need supportive environments for optimal motivational, affective, and behavioural outcomes. For the first time positive associations were identified between needs support, need satisfaction, and athletes' training behaviours. Furthermore, the crucial role of self-talk in the motivational experience was highlighted. Findings regarding the functional significance of self-talk have important theoretical and applied implications, not least highlighting the role of how we experience our self-talk in determining our affective and behavioural response to the social environment. Further research which builds on this series of studies will lead to a greater understanding of how self-speech is related to motivational processes and human behaviour.

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INFORMATION SHEET FOR POTENTIAL PARTICIPANTS IN A RESEARCH PROJECT OR EXPERIMENT

Title of Research Project: The Use of Self Talk during Cognitive Tasks.

Thank you for your interest in this project. The purpose of this information sheet is to describe the procedure of this study and to inform you of your rights should you decide to participate.

Involvement in this study is voluntary and you are free to withdraw at any time. If you decide to participate you will be asked to attend one 30 minute session at the School of Sport, Health and Exercise Sciences, University of Wales, Bangor. This session involves familiarisation with the think-aloud protocol that will be used in the study. Additionally, you will be required to complete a series of problem-solving tasks for 15 minutes whilst reporting your thoughts aloud. **These will be recorded onto an audio tape**. Once the session has been completed participants will be fully debriefed, and will have to opportunity to provide feedback on their experience of the study.

All the data you provide is totally confidential. The audio tapes recorded will be kept in the custody of the researcher until they have been transcribed, after which time the audio files will be deleted. Access to the tapes will be determined by the researcher and may include additional transcribers for analysis if this is necessary. All data will be stored under participant numbers rather than names to ensure anonymity, and the findings of this study will be presented in such a way that it will not be possible for any one individual to be identified.

If you have any doubts, or questions, or would like something explained to you in more detail please do not hesitate to ask. Please take time to consider the information above before indicating whether or not you would be willing to participate in this study. APPENDIX B – Example of informed consent form.

INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT OR EXPERIMENT

Title of Research Project: The Use of Self Talk during cognitive tasks.

The researcher conducting this project subscribes to the ethics conduct of research and to the protection at all times of the interests, comfort, and safety of participants. This form and the information sheet have been given to you for your own protection and full understanding of the procedures. Your signature on this form will signify that you have received information which describes the procedures, possible risks, and benefits of this research project, that you have received an adequate opportunity to consider the information, and that you voluntarily agree to participate in the project.

Having been asked by Emily Oliver of the School of Sport, Health and Exercise Sciences at Bangor University, to participate in a research project, I have received information regarding the procedures of the experiment.

I understand the procedures to be used in this experiment and any possible personal risks to me in taking part. I understand that I may withdraw my participation in this experiment at any time.

I also understand that I may register any complaint I might have about this experiment to Professor Lew Hardy, Head of the School of Sport Health and Exercise Sciences, and that I will be offered the opportunity of providing feedback on the experiment using standard report forms.

I may obtain copies of the results of this study, upon its completion, by contacting: Emily Oliver [pep202@bangor.ac.uk] c/o School of Sport, Health and Exercise Sciences George Building, Bangor, Gwynedd. LL57 2PZ

I confirm that I have been given adequate opportunity to ask any questions and that these have been answered to my satisfaction. I have been informed that the research material will be held confidential by the researcher.

I agree to participate in the study

Signature:	
NAME (please type or print legibly):	A
ADDRESS: (Optional)	5 ×
PARTICIPANT'S SIGNATURE:	DATE:
RESEARCHER'S SIGNATURE:	DATE :

APPENDIX C – Example of ethics review form & supplementary information.

ETHICS REVIEW AND APPROVAL FORM

1. Title of project: The use of self-talk in controlling and autonomy-supportive contexts.

2. Name of researcher(s): Emily Oliver

3. Name of supervisor: Dr James Hardy and Dr Dave Markland

4. Proposed starting date: 8th January 2007 Proposed duration: Approx. 2 months

5. Briefly describe the sample of persons to be used in this study (include ages, gender, and special status, e.g. learning disabled).

It is anticipated that participants (n = 60) will be sampled from a student population. The sample will include both male and female participants, and all participants will be over 18 years of age.

6. Methods of recruiting participants (describe):

Participants will be recruited using posters, postings on electronic notice boards and by verbal requests (during lectures for example).

7. Where will the study take place, e.g. university, school, hospital?

It is expected that the study will take place in a motor control laboratory in the School of Sport, Health and Exercise Sciences at the University of Wales, Bangor.

8. Give an estimate of the amount of time you will require of each participant in the study/project.

Participants will be required to attend two separate sessions which will take approximately 30 minutes each.

9. Do you intend to pay participants for their participation?	NO
(If yes, what form will the payment take).	

10. Will you be using any form of deception?

Participants are not deceived, but are unaware of the full purpose of the study. See attached procedure and ethical review.

11. Will this study involve any of the following manipulations?:

а	Physiological	NO
b.	Psychological	YES
c.	Other controversial or potentially risky manipulations	NO
d. any q	In the case of questionnaire formats, will the study involve uestions which may be upsetting?	NO
e. negat	Do the hypotheses of your study involve the induction of tive effects upon the participants (e.g. learned helplessness)	NO

If 'yes' to a, b, c, d and/or e, describe:

YES*

See attached procedural review for detail.

12. If your study has the potential for "upsetting" participants (e.g. affective manipulation) and/or for identifying distressed or disturbed individuals you must make "a priori" arrangements to mitigate such effects (e.g. debriefing). Please specify the nature of such arrangements, if required.

It is felt that there is a slight risk of negative effects on psychological well being as a result of the controlling experimental condition. It is proposed that this will be counteracted by the use of a competence-inducing statement at the end of the experiment, which should have a positive effect on psychological well-being. Additionally, all participants will be debriefed immediately following the cessation of the experiment.

13. Is there any risk to participants (physical and/or psychological)?: YES If "yes" please explain fully what the risks are, how you plan to mitigate these, and justify their necessity.

See answer to Q12.

14. How do you plan to handle the requirement of confidentiality?

All data will be stored under participant numbers as opposed to names. Information will only be used if prior written consent has been provided by the participant. All participants will be entitled to their data on request.

 During your data collection will supervision or assistance be required? (e.g., for experiments in the physiology laboratory) 	NO				
16. Will informed consent be obtained?	YES				
17. Will a medical questionnaire need to be administered?	NO				
18. Will a pre-study questionnaire need to be administered?	NO				
19. Does your project involve using children under the age of 18 as you're participant population?					
20. Does your project use special participants (e.g., physically impaired/mentally impaired) as your participant population?	NO				
21. Thus, is parental/guardian consent required for your project?	NO				

22. If your project requires you to have any unsupervised access to children under the age of 16, police screening needs to be carried out. This requires a Criminal Records Bureau Disclosure Form to be completed (see Appendix 5 for details). N/A

23. Does your project require you to have any substantial unsupervised access to children between the age of 16 and 18? **NO**

With reference to items 22 or 23 above, does police screening need to be carried out? NO

Procedure and Ethical Review: Study 1.

Purpose:

An autonomy-supportive rather than controlling social context has been shown to enhance performance, persistence, learning and well-being; however, little is known about the cognitions which accompany these effects. It has been argued that self talk can affect confidence, emotional state, motivation and behaviour, therefore it would seem important to analyse individuals' self-verbalizations under these two conditions. The primary purpose of this study is therefore to examine the use of self-talk in controlling and autonomy-supportive environments.

Procedure:

Participants (n = 50) will be randomly assigned to one of two experimental groups, in which communication will be either controlling or autonomy-supportive. This study will utilise Deci, Eghrari, Patrick and Leone's (1994) protocol in which social context is manipulated by the presence or absence of three experimenter-delivered factors; providing a meaningful rationale for the task, acknowledging the feelings of the behaver, and conveying a sense of choice. The final factor, conveying a sense of choice, is altered by the language used by experimenter e.g. "you must, you have to, you should" v. "you might like to, if you would like to". Previous empirical studies have manipulated social context through the use of either autonomy-supportive or controlling instructional sets. For example, Vansteenkiste, Simons, Lens, Soenens and Matos (2005) altered the wording of a written accompaniment to a text and were able to differentially elicit externally controlling, internally controlling and autonomous behavioural regulations for academic learning. In the proposed study, in order to reinforce the manipulation, a set of controlling or autonomy-supportive written instructions will also be given to participants, who will be instructed to read them immediately prior to commencing the task.

It is anticipated that prior to running this experiment, pilot testing (n = 10) will be carried out. This is in order to establish an appropriate length of time for the task, to develop familiarisation with the audio recording equipment and with delivering the

protocol, and to check the efficacy of the experimental manipulation. Additionally, pilot testing will be used to assess which task or computer program will be used, as this needs to be sufficiently interesting to stimulate free choice behaviour in some participants whilst still enabling the participants to think-aloud during task completion. It is likely that the task will comprise of either a simple reaction time, a visual recognition task, or an alternative problem solving task (e.g. mazes).

Participants' self-talk will be recorded during completion of a simple, computer-based task. A 'think aloud' method of assessment will be used, in which participants are required to verbalize all thoughts and feelings (Meichenbaum & Butler, 1979). Participants will be recorded for the duration of the experiment using a digital audio recorder. Due to the difficulties of using this protocol a familiarisation session will be held, which will make it possible to test for pre-experimental differences in the types of self-talk used. During the familiarisation session the instructions given to participants will be standardised across conditions, and a different task (e.g. minesweeper) will be used.

In the second session, participants will be seated at a desk in front of a computer. The experimenter will then deliver the verbal instructions according to the experimental condition of the participant. Following this, participants will read the written instructions and will then commence the task. Following the completion of the task, participants will be left alone for five minutes and informed that whilst the experimenter leaves they can continue with the task if they wish. During this free choice period time spent on the task will be recorded. After five minutes the experimenter will return and debrief the participants.

Analysis:

All audio recordings will be transcribed then primarily analysed using the Linguistic Inquiry and Word Count (LIWC) program (Pennebaker, Francis & Booth, 2001). This software calculates rates of word usage for a range of categories including standard linguistic dimensions (e.g. prepositions: on, to, from) and more advanced conceptual categories such as affective or emotional processes (e.g. positive feelings: happy, joy, love). A custom dictionary will be developed in order to test for words that reflect controlling or autonomous self-talk. Transcripts will also be content analysed to identify patterns of thoughts or phrases, which may allow a more in-depth understanding of the nature of the self-talk used than word frequency alone.

Although not of primary interest, task performance data will be also be examined. Average reaction time, error rate and time spent on the trial during the free choice period will be compared between the two conditions using independent sample t-tests. Additionally, a mediational model will be tested to examine whether the effect of environment type on free choice behaviour is mediated by use of self-talk. Self-talk will be calculated as either a word frequency or ratio score (e.g. controlling self-talk: total self-talk) for this analysis.

Ethical Considerations:

This study will be conducted in accordance with the ethical guidelines of the School of Sport, Health and Exercise Sciences (2005). Potential participants will be provided with an information sheet explaining that the purpose of the study is to examine self-talk and cognitions during task performance. The information sheet will clearly describe the procedure of the study and what they should expect, and in particular it will be emphasised that they will be audio-recorded for the duration of the trials period. They will be informed that they have the right to withdraw from the study at any time, and informed consent to participate will be sought prior to beginning any form of data collection. Participants will not be minors or from dependent populations.

It is important to note at this point that due to the nature of this study, participants will be blind to its true purpose. In the present study it was felt that an alternative procedure, in which participants are fully aware of the social contextual manipulation, would be inappropriate as this may bias participant responses. It is felt that participants will be unlikely to show unease once fully debriefed. All participants will be debriefed and informed of the true nature of the study immediately following the cessation of the 15-minute testing period, and all participants will be given the chance to provide feedback on their experiences.

It is also important to consider the potential harmful effect of the controlling environmental condition. Research has consistently shown that a controlling environment is associated with decreased well-being (e.g. Ryan & Connell, 1989; Deci & Ryan, 2000). Although the vast majority of such studies have examined a relatively long-term exposure to controlling conditions (e.g. the duration of a school year), a study by Reis, Sheldon, Gable, Roscoe and Ryan (2000) demonstrated that daily fluctuations in the satisfaction of need for autonomy predicted fluctuations in daily well-being. In the present study participants are only exposed to the controlling condition for a short amount of time (approximately fifteen minutes), therefore it is anticipated that any negative effects will be minimal and short-lasting. However, in order to counteract a potential negative effect, at the culmination of the trials all participants will be informed that they have done well on the activity, which should enhance their sense of perceived competence (as used in Deci et al.'s 1994 protocol). Satisfaction of the need for competence is also a predictor of daily well-being (Reis et al., 2000).

All data will be stored in an anonymous manner using subject numbers instead of names. The audio tapes will be kept in the custody of the researcher until they have been transcribed, after which time the files will be deleted. Access to the tapes will be determined by the researcher and may include additional transcribers for analysis if this is necessary. This information will be made clear to all participants prior to obtaining informed consent.

APPENDIX D - Verbal instructional sets - Study 1.

Scripted Verbal Instructional Set: low controlling (high controlling)

N.B. Script and modifications are based on Eghrari, Deci et al.'s previous study using this protocol, italicised section taken from Ericeson and Simon's (1996) practical guidelines for talk aloud studies.

Introduction and Warm up Tasks:

In this experiment we are interested in finding out how people perceive and problem solve during different types of activities. This activity <u>involves engaging</u> (requires you to think) in several trials of a problem-solving task, and afterwards, answering questionnaires about your experiences with the activity.

In this experiment we are interested in what you say to yourself as you perform tasks (that we assign you). In order to do this <u>we would like it if you could (you must)</u> talk aloud as you work on the problems. What I mean by talk aloud is <u>saying (you should</u> say) out loud everything that comes into your head, regardless of what it refers to. Just act as if you are alone in the room speaking to yourself. If you are silent for any length of time I will <u>ask you to try</u> (tell you) to keep talking aloud. Do you understand what to (you must) do?

Good, before we turn to the real experiment, we <u>can</u> (will) start with a couple of practice problems. I <u>would like you</u> (want you) to talk aloud while you do these problems. First I will ask you to multiply two numbers in your head. So, firstly <u>I would like you to</u> (you should) think aloud whilst you work out how many windows there are in your house:

Good, now <u>try to</u> remember what you saw on your way here today. OK, now, <u>can you</u> talk aloud while you multiply 24 times 34.

Ok, <u>if you feel you are familiar</u> (as you are familiar) with the talk aloud protocol we <u>can</u> (will now) move to the experimental task.

<u>The task involves attending</u> (what you must do is attend) to the computer screen, and completing (complete) a series of mazes. Once we move to the terminal I will fully explain <u>all</u> the details (what you have to do) and after that you may get ready to start the activity (you

must get ready to start the activity). As you know you can withdraw from the task at any time, without any penalty

Oh, there's one more thing I'd like to say. I know that doing this is not much fun; in fact many subjects have told me that it's pretty boring. So I can perfectly understand and accept that you might not find it very interesting.

Subjects are seated at the computer.

Ok. Before we begin the actual trials, you <u>may have a practice trial</u> (you should complete a practice trial). I will first explain what <u>to</u> (you should) do and <u>you can decide when to begin</u> (I will tell you when to begin). All <u>you do</u> (you should do) is use the arrow keys on the keyboard to move around the maze from the start to the end target. After a maze is completed you <u>may</u> (must) click on the print button before moving on to the next maze.

Subjects complete practice trial.

Ok, now before you start the actual trials there are written instructions <u>you can read</u> (you must read) to check you have fully understood the procedure.

Subjects read written instructions.

Ok. Is everything clear? Now you have a sense of the task you <u>may</u> (must) begin the actual trials. After you finish <u>I'll ask you to</u> (you will) answer a questionnaire. While you are doing this I'll be seated there. When the trial period is over I will let you know.

If you are willing to continue all you need to do is to start the activity (You should start the activity now).

Subjects complete actual trials.

I just need to collect the questionnaires from my office; I'll only be a few minutes. By the way, if you want to run some more trials you're welcome to do so.

Subjects left alone for five minutes while experimenter retrieves questionnaire.

APPENDIX E – Written instructional sets – Study 1.

Written Instructional Set 1 (controlling):

The purpose of this study is to examine self-talk during problem solving tasks.

During the task you must attend to the computer screen and complete a series of mazes until the experimenter tells you to stop. You should move around the maze using the arrow keys on the keyboard.

Whilst completing the mazes, remember that you must say aloud *everything* that comes into your head. Do not explain what you are doing, just act as if you are alone, speaking to yourself as you solve the maze. If you are silent for any length of time I will tell you to keep talking aloud.

When you have read these instructions you should inform the experimenter and prepare to begin the task.

Written Instructional Set 2 (autonomy-supportive):

The purpose of this study is to examine self-talk during problem solving tasks. Doing this activity has been shown to be useful, as we have found that those subjects who have done it have learned about their own concentration and problem solving skills. This has occurred because the activity involves focussed attention, which is important in concentration.

During the task you can attend to the computer screen and complete a series of mazes. To move around the maze you can use the arrow keys on the keyboard.

Whilst completing the mazes we would like you to try to say aloud *everything* that comes into your head. Try not to explain what you are doing, just act as if you are alone, speaking to yourself as you solve the maze. If you are silent for any length of time I will ask you to try to keep talking aloud.

Please inform the experimenter when you have read these instructions and are ready to begin the task.

APPENDIX F – Interview Guide – Study 3.

1. Opening Questions: Purpose - to make people feel comfortable; fact-based.

- Please introduce yourselves and tell us what sport you coach, and how long you have been coaching for?
- What type of players do you typically coach (gender/level)?
- What size of group/squad do you usually train with?

2. Introductory Questions: To encourage conversation and interaction among the participants by introducing topic in open-ended manner. Get participants and researchers to the same understanding of the topic.

• Could you tell us briefly a bit about what a typical training session involves for you? *Prompts: Structure of session, who leads the session, how long spent on each type of activity etc.*

3. Transition Questions: To help participants broaden their understanding from the introductory questions. To connect the participant and the topic under investigation.

• When you hear the term 'training behaviours', what comes to mind? Prompts: What different attitudes do athletes show / demonstrate during training?

What different ways do athletes behave during training?

- In your experience, to what extent/how do you think athletes' training behaviours can influence their performances / their development / their teammates?
- 4. Key Questions: To drive the session, 2-5questions taking 10-15mins to answer.
 - How do you like your athletes to behave during training?

Prompts: What positive behaviours/ things do you like your athletes to

do?

E.g., pay attention when instructions are given What negative behaviours/things do you not like your athletes to do? E.g., put less effort in towards the end of a session

• What behaviours / attributes do you think are necessary for an athlete to train effectively / train well?

Prompt: For example, do you think certain personality-types make 'better trainers'?

In what ways can players help training sessions flow smoothly? In what ways can players interrupt training sessions?

- [List distributed to participants] This list shows behaviours which other coaches have felt were important – how relevant or important do you think these are?
- 5. Ending Questions: Bring closure to the debate and reflect on previous comments
 - Do you feel that any of the behaviours discussed are specific to your own sport or do you feel they could apply more widely?
 - Is there anything else you would like to add or anything we have missed?
- 6. Summary Questions:
 - [Assistant Moderator gives summary] Is this an adequate summary? Does it capture what was said here today?
 - Have I misrepresented / misinterpreted anything?

APPENDIX G – Observers' Coaching Checklist – Study 5.

Date of Session:								
Rater Initials:	No	o. of p	olaye	rs: _				
<u>Autonomy Support</u>								
 Relies on Extrinsic Motivational Resources Incentives, consequence, directives Seeks compliance 	1	2	3	4	5	6	7	 Nurtures Intrinsic Motivational Resources Interest, enjoyment, challenge Competence, confidence, choice making
 Controlling Language Controlling, coercive Should, Must, Have to, Got to Pressuring, rigid, 'no nonsense' 	1	2	3	4	5	6	7	Informational Language Informational Flexible Not at all controlling
 Neglects Value/Importance of session or tasks Does not convey value, meaning, use, benefit, importance 	1	2	3	4	5	6	7	Identifies value/importance of session and tasks Identifies and conveys the importance of the session and tasks
 Reaction to negative affect: Is not ok, change it Negative affect is unacceptable Tries to fix, counter, or change into something else 	1	2	3	4	5	6	7	 Responds well to players' feelings, listens, Accepts Listens carefully Open to complaints Accepts as a valid reaction
<u>Structure</u>								
 During warm up / session introduction: Absent, confusing, unclear, complicated Rules or plans are absent or confusing Little or no organisation 	1	2	3	4	5	6	7	 Clear, predictable, understandable, detailed Clearly stated plans Frames upcoming session well Clear organization
During session: Poor leadership • Fails to show leadership • No plan, no goals	1	2	3	4	5	6	7	 Strong leadership organized, leader, conductor Clear plan, clear goals

 High, hard workload Much challenge, fast pace Asks for full capacity 	1	2	3	4	5	6	7	 Low, easy workload Little challenge, slow pace Asks for only small capacity
 Scaffolding is richly present Advice, prompts, direction Answers questions well, fully 	1	2	3	4	5	6	7	 Scaffolding is fully absent Lack of advice, prompts, direction Questions missed, answered poorly
During Feedback/Post-session: None, ambiguous, off-task, rambling	1	2	3	4	5	6	7	Skill building, informative, instructive feedback
Flat, un-emotive toneBored, disinterested, flat	1	2	3	4	5	6	7	Positive emotional toneEnjoyment, interested, fun
Involvement								
 Seems cold, closed business like Doesn't seem to enjoy time with players 	1	2	3	4	5	6	7	 Seems warm, open Expresses emotion, affection, caring Does enjoy time with players
Withholds personal resourcesTime, attention, energy	1	2	3	4	5	6	7	Invests personal resources Time, attention, energy
 Physical Proximity distant Keeps distance Doesn't move about the group 	1	2	3	4	5	6	7	 Physical proximity close Walks over to players Stands near / sits close
Doesn't know players No mention of names, personal histories, needs	1	2	3	4	5	6	7	Knows playersKnows names, personal histories, needs etc.

APPENDIX H – Example of club feedback report – Study 5.

Ysgol Gwyddorau Chwaraeon, Iechyd ac Ymarfer Prifysgol Cymru, Bangor

Adeilad y George Bangor, Gwynedd LL57 2PZ

Ffön: (01248) 382756/383491 Swyddfa Gyffredinol Ffacs: (01248) 371053 e-bost: shes@bangor.ac.uk http://www.shes.bangor.ac.uk



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Elite Youth Training Study: Initial Feedback

Name of Team: Number of Participants: 16 Players, 2 Coaches

What was the study about?

Thank you once again for your recent participation in this research study. The information provided will be used to investigate factors that affect the training behaviours, and development, of elite youth football players. Researchers have suggested that certain coaching and environmental factors are important for the well-being and progression of young athletes (e.g., Pelletier et al., 2001). Specifically, self-determination theory (Deci & Ryan, 1985; 2000) suggests that there are three important types of coaching behaviours, which should positively influence players. In this study the three behaviours measured were:

- Autonomy Support i.e. providing players with choices and options, making them feel their input and opinions are valid, not overly controlling or pressurising players.
- Structure i.e. providing clear instructions and feedback, and rationale for activities/drills.
- Involvement i.e. interacting one-on-one with players, good personal relationships, and awareness of individual players' needs.

In addition, we asked coaches and players to rate their training behaviours. The

behaviours we asked about included the following:

- > Professional behaviour e.g., arriving on time, bringing all kit needed.
- Professional attitude e.g., showing respect to coach and team-mates.

- Motivation e.g., being committed, and determined to succeed in your career.
- **Coping** e.g., able to bounce back from setbacks.
- Seeking Improvement e.g., asking questions, self-evaluating during the session.
- **Concentration** e.g., paying attention to instructions.
- > Effort

On the following page, a diagram of the proposed model tested in the current study can be seen.

Proposed theoretical model showing components measured in the current study:

When the full sample of data has been collected, we will analyse whether this model is accurate, and identify which factors are most important in terms of players' training and their progression.



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Initial Descriptive Feedback:

COACHING:

The following graph shows how players rated their coaching, both generally (in white), and for that specific session (in black).

Figure 1: Players' ratings of Coaches' Behaviours:



It can be seen that players rated their coaches as typically providing high levels of autonomy support, structure and involvement (potential scoring ranged from 1 to 5). This is likely to be beneficial as, so far, our findings suggest that players' ratings of coach's autonomy support, structure and involvement are positively correlated with player's relatedness (i.e., how close, safe, and looked after they feel within their sporting environment). Players' feelings of autonomy are also positively linked with high levels of coach involvement. This means that players feel they have greater choice, input, and control if their coach displays high levels of involvement-type behaviours.

There is also some initial evidence that coaches who provide more autonomy support, structure and involvement, have players who engage in more positive training behaviours, specifically they score higher on motivation related variables, have more professional attitudes, and report higher levels of seeking improvement. So, put briefly, coaches who score highly on these factors are likely to have players who train better.

TRAINING BEHAVIOURS:

It is possible to examine training behaviour ratings, given by both coaches and players. The following graph shows how coaches scored players on average for four training behaviours. The data has been split so that you can compare the average scores for the year 1 and year 2 players.

Figure 2: Comparing Year 1 and Year 2 average coach ratings for training behaviours.



** Difference between year 1 and 2 players is significant at $p \le .05$; * difference is significant at $p \le .10$

This figure indicates that the Year 2 players were perceived by their coaches as training more effectively, by putting in more effort, concentrating more, and seeking improvement (e.g., by asking more questions or actively seeking feedback). However, the year 2 players engaged in more negative behaviour, however, this was generally quite low.

Training behaviours can also be examined on a player-by-player basis. As this data was collected for research purposes, player ID numbers have been used instead of names in the following graphs. However, this may be a useful tool in the future to identify players who could be training more effectively, or as a way for players to monitor their training over time. The following graphs show both coach and player scores for four main training behaviours.

N.B. If players wish to request graphs etc. of their individual data (excluding coach's ratings) I am happy to provide this (see contact details below).

Where there are no bars, that player did not provide data. Either a data point was missing (e.g., missed out a question), or the player did not train (i.e., was injured).



Figure 3: Coach and Player ratings for Effort:

This figure (3) suggests that coaches rated players in general higher than players rated themselves. Specific players can be seen (e.g., players 5 and 11) who felt they were working less hard than the coach felt they were. In addition, in some cases (e.g., players 3 and 13) the player felt they were working harder than the coach perceived them to be. It may be that these differences are too small to be significant; this is something we hope to look at when we have a full sample of data. However, this kind of analysis might allow coaches to help players to better understand what is expected of them, and how hard they should be trying.



Figure 4: Coach and Player ratings for Concentration:

Another possible use of graphs such as these would be to identify players who had problems with specific behaviours. For example, in the graph above players 9 and 2 are rated as low in concentration. It might be possible to conduct some additional work with those players specifically, perhaps working on focusing technique, or selftalk cue words, to assist them in their ability to focus throughout a session.

Figure 5: Coach and Player ratings for Seeking Improvement:



The differences in this behaviour between coach and player ratings seem to be the greatest. Players do not report engaging in behaviour associated with seeking improvement, such as asking questions, self-evaluating, and seeking feedback. If this behaviour is important for players' development, increasing its occurrence would be beneficial.



Figure 6: Coach and Player ratings for Negative Behaviours:

Interestingly, in this figure two players (1 and 5) were rated as engaging in moderate amounts of negative behaviours by the coach, however, neither player scored themselves highly on this. It might be that using this type of diagram, coaches can clarify the behaviour they do and do not expected to see to certain players, who might not be aware when they are messing about or not listening for example.

MOTIVATION:

Lastly, we assessed players' motivation. The questionnaire we used allows us break players motivation down into different types. The six main types we measured are explained below:

- > Amotivation unmotivated, no clear reasons for taking part.
- External participates for external rewards such as praise, fame, and financial success.
- > Introjected participates out of guilt, shame, or self-pressure.
- Identified participates because they identify with and see the value of the outcomes of taking part.
- Integrated participates because they fully value the activity for its own sake.
- Intrinsic- fully self-determined, participation is due to enjoyment and satisfaction.

More self-determined motives (i.e., autonomous participation)

As you can see, the arrow at the side indicates that as you move from amotivation towards intrinsic motivation, regulation becomes more self-determined. Research has shown that athletes with more self-determined forms of motivation are more likely to persist with an activity, to invest greater effort, and to have enhanced well-being, compared to those with less self-determined motives. Therefore, ideally you would like players to have more self-determined forms of motivation (i.e., identified, integrated and intrinsic).

One way to foster more self-determined forms of motivation is to provide support for players' autonomy, competence (i.e. feelings of mastery and that they are capable and skilled), and relatedness (i.e. feelings of belongingness).

The graph on the following page gives you an indication of how you might use players' ratings of their motives for taking part to form motivational profiles. This diagram shows all 16 players, however, you could break this down or highlight certain players to work with further. Again, where bars are missing this shows a missing data point rather than a score of zero for that motive.

Overall, you can see that the players generally have profiles that are slanted towards higher levels of self-determined motives, which theory and research suggests predict positive outcomes. However, if you look at player 14, overall their motivation scores across the board seem low, and player 11 has moderate scores on both controlled and self-determined motives. These might be players who would benefit from additional support to attempt to increase their self-determined motivation.

Figure 7: Players' motivational profiles.



■ Amotivation ■ External □ Introjected □ Identified ■ Intrinsic

What Happens Next?

In order to test the full model, and to work out which factors are most important for predicting players' training behaviour and progression, more data needs to be collected. Once we have the full sample we will be able to provide more detailed feedback relating to the main purposes of the study. In addition, we will be testing whether the things that players say and think to themselves during a training session are related to how well they train. This is an area that has some potential regarding interventions, as if players are using maladaptive self-talk, this may be something that can be altered using cognitive restructuring or other psychological skills training techniques.

We also intend to collect data towards the end of the season on players' performances and improvement over the course of the season, to see whether the factors we tested (e.g., training behaviours) are related to players' improvements.

More Information Required?

If you have any further queries or would like a copy of the study in its entirety when written up, please contact me on the details shown below. In addition, if the players wish to receive feedback on their individual results I am more than happy to provide this if they contact me through the details below.

Best of luck for this season, and thanks again for all your assistance.

Emily Oliver

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APPENDIX I - Training attitudes and behaviours questionnaire - state version.

Training Attitudes and Behaviours Questionnaire (TAB-Q) Version Y (State).

The statements below relate to how you trained during **today's session**. Please circle the number which best indicates the extent to which you agree or disagree with that statement.

	Strongly Disagree						Strongly Agree
1. I put maximal effort into the training session.	1	2	3	4	5	6	7
2. I completed all drills and workouts to a high standard.	1	2	3	4	5	6	7
3. I had to ask for instructions to be repeated because I didn't listen.	1	2	3	4	5	6	7
4. I misbehaved during the session.	1	2	3	4	5	6	7
5. I put as much effort into the session as possible.	1	2	3	4	5	6	7
6. I answered questions from the coach.	1	2	3	4	5	6	7
7. I thought about irrelevant things during the session.	1	2	3	4	5	6	7
8. I put in 100% effort throughout the session.	1	2	3	4	5	6	7
9. I asked the coach how I could improve my performance.	1	2	3	4	5	6	7
10. I moaned during the session.	1	2	3	4	5	6	7

11. I was totally committed to working hard in the session.	1	2	3	4	5	6	7
12. I evaluated how well I was performing.	1	2	3	4	5	6	7
13. I found it difficult to stay focused during the session.	1	2	3	4	5	6	7
14. I was told off during the session.	1	2	3	4	5	6	7
15. I asked the coach how I could get better.	1	2	3	4	5	6	7
16. I distracted others during training.	1	2	3	4	5	6	7
17. I was easily distracted during the session.	1	2	3	4	5	6	7
18. I listened carefully to the coach during training.	1	2	3	4	5	6	7
19. I felt my mind wander during the session.	1	2	3	4	5	6	7

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APPENDIX J – Training attitudes and behaviours questionnaire – trait version.

Training Attitudes and Behaviours Questionnaire (TAB-Q) Version X (Trait).

The statements below relate to how you **<u>usually</u>** train. Please circle the number which best indicates the extent to which you agree or disagree with that statement.

	Strongly Disagree						Strongly Agree
1. I always turn up with the correct kit for training.	1	2	3	4	5	6	7
2. I am totally committed to achieving my goals.	1	2	3	4	5	6	7
3. I can cope well with setbacks.	1	2	3	4	5	6	7
4. I complete any additional workouts I am set.	1	2	3	4	5	6	7
5. I turn up for training with plenty of time to get ready.	1	2	3	4	5	6	7
6. I have a high regard for my coach.	1	2	3	4	5	6	7
7. I am highly motivated to succeed.	1	2	3	4	5	6	7
8. If I perform poorly I work hard to put things right.	1	2	3	4	5	6	7
9. I check if I am doing as well as I should be.	1	2	3	4	5	6	7
10. I do extra training in my own time if needed.	1	2	3	4	5	6	7

11. I never miss a training session.	1	2	3	4	5	6	7
12. I respect my team-mates.	1	2	3	4	5	6	7
13. If things don't go my way I try harder.	1	2	3	4	5	6	7
14. I am always willing to do extra workouts.	1	2	3	4	5	6	7
15. I am always on time for training.	1	2	3	4	5	6	7
16. I am honest with coaching staff.	1	2	3	4	5	6	7
17. I am driven to succeed.	1	2	3	4	5	6	7
18. I assess my performance during every session.	1	2	3	4	5	6	7
19. I always try my hardest during training.	1	2	3	4	5	6	7
20. I am professional in my approach to training.	1	2	3	4	5	6	7
21. I am very competitive.	1	2	3	4	5	6	7
22. I put in 100% effort all the time.	1	2	3	4	5	6	7
23. Sometimes I ease off if I am not being watched.	1	2	3	4	5	6	7
24. I show respect for my coach.	1	2	3	4	5	6	7
25. I am focused on succeeding in my sport.	1	2	3	4	5	6	7
26. When I am given negative feedback I use it to improve.	1	2	3	4	5	6	7
27. I put as much effort into training as possible.	1	2	3	4	5	6	7

28. I am mentally strong.	1	2	3	4	5	6	7
29. I am lazy during training.	1	2	3	4	5	6	7
30. I ask the coach for feedback on how I am doing.	1	2	3	4	5	6	7
31. I always carry out drills and exercises as well as I can.	1	2	3	4	5	6	7

APPENDIX K – Informational and controlling self-talk questionnaire.

The term 'self-talk' refers to things people say to themselves, either out loud or inside their head. Self-talk may be whole sentences or phrases, or sometimes just a few words. We want you to think of the three most important things you said to yourself during training today. In the large box below (marked Training Self-talk), write these statements down.

Training Self-Talk:

Now, thinking about your self-talk over the course of the training session, answer all of the questions below by circling the numbers which best correspond to your self-talk. There are no right or wrong answers and do not spend too much time on any statement but give the answer which seems to describe your response best.

Overall, my self-talk	Not at all				Very much so
1. Made me feel I was in control	1	2	3	4	5
2. Made me feel pressured	1	2	3	4	5
3. Was encouraging	1	2	3	4	5
4. Made me feel I had no choices	1	2	3	4	5
5. Made me feel more in charge	1	2	3	4	5
6. Assisted my understanding	1	2	3	4	5
7. Was critical	1	2	3	4	5
8. Provided me with positive feedback	1	2	3	4	5
9. Made me feel I had no control over the situation	1	2	3	4	5
10. Helped reduce the pressure I put on myself	1	2	3	4	5
11. Reassured me that I was in control	1	2	3	4	5

APPENDIX L - Coach rating sheet for players' training behaviours.

Coach Rating Grid:	Team Name:	Coach Name:
	roann nannor	

Instructions: Using the grid, please respond to the categories below giving a rating for each player in turn. Insert each player's initials in the first row, then give them a rating out of 10 for each of the four categories. Please base your ratings of players only on their behaviour in today's training session. N.B. High scores indicate that players engaged in the behaviours a great deal (i.e. they put in a lot of effort, concentrated well, sought ways to improve, and engaged in a lot of negative behaviour).

Player initials											
Effort (e.g., working hard, putting in as much effort as possible).									(1		
Concentration (e.g., staying focused, paying attention).											
Seeking Improvement (e.g., asking questions, evaluating own perf).											
Negative Behaviour (e.g., messing about, being disruptive).											

APPENDIX M - Research Curriculum Vitae.

Research Experience

Published full papers

Oliver, E.J., Hardy, J., & Markland, D. (2010). Exploring elite coaches' views of athletes' practice behaviours. *Psychology of Sport & Exercise*. 11, 433-443.

Law, R., Breslin, A., Oliver, E.J., Mawn, L., Markland, D., Maddison, P., & Thom, J. (in press). Patient perceptions of the effects of exercise on joint health in rheumatoid arthritis. *Rheumatology*.

Oliver, E.J., Markland, D., & Hardy, J. (2010). Interpretation of self-talk and post-lecture affective states of higher education students: A self-determination theory perspective. *British Journal of Educational Psychology*, 80(2), 307-323.

Oliver, E.J., Markland, D., Hardy, J., & Petherick, C.M. (2008). The Effects of Autonomy-Supportive and Controlling Environments on Self-Talk. *Motivation and Emotion*, 32(3), 200-212.

Markland, D. & Oliver, E.J. (2008). The Sociocultural Attitudes Towards Appearance Questionnaire-3: A confirmatory factor analysis. *Body Image: An International Journal of Research*. 5(1), 116-121.

Peer Reviewed Book Chapters

Hardy, J., Oliver, E.J., & Tod, D. (2008). A Framework for the Study and Application of Self-talk within Sport. In S. D. Mellalieu & S. Hanton (eds.) *Advances in Applied Sport Psychology*. London: Routledge.

Oliver, E.J. (2010). Group Cohesion in Sport. In D. Tod, J. Thatcher, & R. Rachman (Eds.) Sport Psychology. In N. Holt & R. Lewis (Eds.) Insights in Psychology. Palgrave.

Published abstracts

Oliver, E.J., Arthur, C.A., & Hardy, L. (2008). Interactive effects of challenging and supportive transformational leadership on self-confidence and resilience. *Journal of Sports Sciences, 26, S2*, 14-15.

Conference presentations

Oral Lectures/Symposia

Oliver, E.J., Hardy, J., & Markland, D. (2010). Associations between the functional significance of self-talk, need satisfaction, and athletes' training behaviours. Paper presented at the 4th International Conference on Self-Determination Theory. Ghent, Belgium.

Markland, D., Oliver, E.J., & Hardy, J. (2010). *The functional significance of self-talk: Associations between informational and controlling self-talk and anxiety.* Paper presented at the 4th International Conference on Self-Determination Theory. Ghent, Belgium.

Oliver, E.J., Hardy, J., & Markland, D. (2009). *Athlete Training Behaviours – Measurement development and preliminary findings*. Paper presented at the 12th International Society of Sport Psychology World Congress, Marrakesh, Morocco.

Beattie, S., Lief, D., & **Oliver, E.J.** (2009). *Investigating the possible negative effects of self-efficacy upon putting performance*. Paper presented at the 12th International Society of Sport Psychology World Congress, Marrakesh, Morocco.

Oliver, E.J., Arthur, C.A., & Hardy, L. (2008). Interactive effects of challenging and supportive transformational leadership on self-confidence and resilience. Paper presented at the BASES Annual Conference, Brunel, UK.

Oliver, E.J., Markland, D. & Hardy, J. (2008). Self-*talk can mediate the effects of Autonomy-supportive and Controlling environments on motivational state.* Paper presented at the 13th Annual Congress of the European College of Sport Science. Estoril: Portugal.

Oliver, E.J., Markland, D., & Hardy, J. (2008). *How to cope with Statistics Lectures and other stressors? Examining links between self-talk and affect.* Paper presented at the 5th All Wales Sport, Exercise Science and Medicine Conference, Swansea, UK.

Markland, D., Oliver, E.J., & Halls, S. (2008). Perceived media pressures, internalisation of the thin ideal, and restrained eating: The buffering effect of global self-determination. Paper presented at the Annual Meeting of The International Society for Behavioural Nutrition and Physical Activity. Banff, Alberta, Canada.

Oliver, E.J. (2008). How to cope with Statistics Lectures and other stressors? Examining links between self-talk and affect. Paper presented at Beyond Boundaries 2008: An Interdisciplinary Conference of the Research Student Forum. Bangor: UK.

Hardy, J. & Oliver, E.J. (2007). Development and preliminary validation of the Positive and Negative Self-Talk Scale (PANSTS). Paper presented as part of the Symposium entitled "Self Talk: State of the art and perspectives in sport psychology research", at the 12th European Congress of Sport Psychology. Halkidiki, Greece.

Poster Presentations

Law, R., Breslin, A., **Oliver, E.J.**, Mawn, L., Markland, D., Maddison, P., & Thom, J. (2010). *Exercise and rheumatoid arthritis: What's in it for us?* Poster presented at the American College of Sport and Medicine Conference, Baltimore, Maryland.

Hardy, J., Staebell, A.A., Oliver, E.J., & Arthur, C. (2009). *Links between self-talk, perceived competence and intrinsic motivation*. Poster presented at the Association for Applied Sport Psychology Annual Conference, Salt Lake City, Utah.

Oliver, E.J., Hardy, J., & Markland, D. (2009). *Exploring elite coaches' views of athletes'' training behaviours*. Poster presented at the 6th All Wales Sport, Exercise Science and Medicine Conference, Aberystwyth, UK.

Law, R., Breslin, A., **Oliver, E.J.**, Mawn, L., Markland, D., Maddison, P., & Thom, J. (2009). *Exercise and rheumatoid arthritis: What's in it for us?*. Poster presented at the 6th All Wales Sport, Exercise Science and Medicine Conference, Aberystwyth, UK.

Oliver, E. J., Markland, D. & Hardy, J. (2007). *The Effects of Autonomy-Supportive and Controlling Environments on Self-talk*. Poster presented at the Third International Conference on Self-Determination Theory. Toronto, Canada.

Oliver, E.J. & Hardy, L. (2007). *Effects of Coaches' Transformational Leadership on Athlete Anxiety* and Self-Confidence. Poster presented at the 12th European Congress of Sport Psychology. Halkidiki, Greece.

Oliver, E.J. & Hardy, L. (2006). *Transformational Leadership and Pre-Competition Anxiety* (*Proposal*). Poster presented at the BASES Student Conference. Edinburgh, Scotland.

Invited presentations

Oliver, E.J., Mawn, L., Sheehy-Kelly, C., & Bell, J. (2010). *Collaborative Sport and Exercise Science at The Institute for the Psychology of Elite Performance*. Presented as part of a symposium entitled "Collaborative Sport and Exercise Science", at the British Association of Sport and Exercise Sciences Student Conference, Aberystwyth, UK.

Oliver, E.J. (2008). *Introduction to self-talk and potential clinical implications*. Presented as part of the combined General Practitioner Special Interest (GPSI) and ESP Muscular Skeletal Team CPD Program. Ysberty Gwynedd, Bangor: U.K.

Scholarships and Academic Awards

SSHES Departmental Studentship	value approx. \$21000 p.a.	2006 – 2009							
European Social Fund Bursary	value approx. \$11000	2005 – 2006							
BASES Student Conference Scientific Communications Postgraduate Poster Presentation Award	ES Student Conference Scientific Communications value approx. \$60 graduate Poster Presentation Award								
1 st prize WISHES Young Investigator Award – Best Oral Presentation	ize WISHES Young Investigator Award – Best value approx. \$60 Presentation								
Higher Education Academy Psychology Network Conference Attendance Bursary	value approx. \$90	2008							
Grant Capture									
Welsh Assembly Government - Knowledge Economy Skills Scholarship. £14,000 May 2010 APPLICANTS: Oliver, E.J., & Akehurst, S.A. PROJECT: Establishing the influence of personality and intrapersonal regulatory style on performance under pressure.									
Higher Education Academy for Hospitality, Leisure, Sport and Tourism. £1,800April 2010Pedagogic Research and Development Fund.APPLICANTS: Mitchell, I., Oliver, E.J., & Tong, R.PROJECT: Reflection and learning in sport and exercise science students: Embedding reflectiveprocesses into undergraduate curricula.									
North Wales Research Committee, North Wales Clinical School. £2,992July 2009APPLICANTS: Hardy, J., Oliver, E.J., Rees, M., Masey, D., & Jones, I.PROJECT: Investigating factors that differentiate initiators versus non-initiators of Phase III Cardiac Rehabilitation.									
Association for Applied Sport Psychology Research Grant - \$1,200 June APPLICANTS: Oliver, E.J., & Hardy, J. PROJECT: The effects of Informational and Controlling Self-talk on Intrinsic Motivation.									
Drapers' Fund and Thos Howell's Education Fund - £99,634 total, over 3 years. Nov. 2008 APPLICANTS: Callow, N., Arthur, C.A., Hardy, J., & Oliver, E.J. PROJECT: Transformational leadership: Student engagement, satisfaction, retention and performance									