MOTIVATION AND GOAL SELF-REGULATION

By

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ABSTRACT

The present thesis extends the goal striving literature by exploring personal and primed autonomous and controlled goal motivation in relation to goal-related outcomes (e.g. persistence, attainment, inter-goal relations), the responses to goal failure, and well- and ill-being. Aligned with the Self-Concordance (SC) Model (Sheldon & Elliot, 1999), the central hypothesis was that autonomous motives would be associated with more adaptive goal pursuit and higher well-being. We investigated this hypothesis within a sporting context.

In Chapter 2, we used ecologically valid video primes to manipulate goal motives. Extending the previous literature, we demonstrated that primed autonomous motives were associated with higher objectively-assessed persistence towards an increasingly difficult goal than primed controlled motives. Chapter 3 showed that primed goal motives did not moderate the responses to goal failure. However we presented recommendations for how future research can investigate how individuals react to goal failure. Within Chapter 4, we blended the SC model with the Hierarchical Model of Motivation (Vallerand, 1997) to explain how coach behaviour can facilitate adaptive goal striving and well-being in team-sport athletes. Finally, Chapter 5 used a person-centred approach to examine autonomous and controlled goal motives when pursuing goals in multiple domains. The results suggested that higher autonomous motives are important for adaptive facilitation between goals.

The research presented within this thesis represents important conceptual advancements of the goal striving literature. Furthermore, we present important practical implications for those engaging in goal pursuit in sport. Overall, we demonstrate the importance of individuals striving for goals which are underpinning by autonomous goal motives.

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LIST OF PAPERS

This thesis is comprised of the following four papers. Study design, data collection, statistical analysis and writing were conducted by Laura Healy. Professor Nikos Ntoumanis advised on study design, data analysis and paper editing. Where listed, co-authors also advised on study design, data analysis and paper editing.

1. Ntoumanis, N., **Healy, L.C.,** Sedikides, C., Duda, J., Stewart, B., Smith, A., & Bond, J. (2014). Role of contextual priming on goal persistence and well-being. *Journal of Personality, 82*, 225-236
2. **Healy, L.C.,** Ntoumanis, N., Stewart, B.D., & Duda, J. (2015). Predicting subsequent task performance from goal motivation and goal failure. *Frontiers in Psychology, 6,* 926
3. **Healy, L.C.,** Ntoumanis, N., Veldhuijzen van Zanten, J.J.C.S., & Paine, N. (2014). Goal striving and well-being in sport: The role of contextual and personal motivation. *Journal of Sport & Exercise Psychology, 36,* 446-459.
4. **Healy, L.C.,** Ntoumanis, N, & Duda, J. (under review). Goal motives and multiple-goal striving in sport and academic: A person-centred investigation of goal motives and inter-goal relations. *Journal of Science & Medicine in Sport*

During the period of postgraduate study within the School of Sport, Exercise and Rehabilitation Sciences at the University of Birmingham, the following articles and conference abstracts were accepted for publication/presentation.

Publications

1. Ntoumanis, N., **Healy, L.C.,** Sedikides, C., Duda, J., Stewart, B., Smith, A., & Bond, J. (2014). When the going gets tough: The "why" of goal striving matters. *Journal of Personality, 82*, 225-236. doi: 10.1111/Jopy.12047
2. **Healy, L.C.,** Ntoumanis, N., Veldhuijzen van Zanten, J.J.C.S., & Paine, N. (2014). Goal striving and well-being in sport: The role of contextual and personal motivation. *Journal of Sport & Exercise Psychology, 36,* 446-459. doi: 10.1123/jsep.2013-0261
3. **Healy, L.C.,** Ntoumanis, N., Stewart, B.D., & Duda, J.L. (2015). Predicting subsequent task performance from goal motivation and goal failure. *Frontiers in Psychology, 6,* 926. doi: 10.3389/psych.2015.00926

Conference Presentations

1. **Healy, L.C.,** Ntoumanis, N., Veldhuijzen van Zanten, J.J.C.S., & Paine, N. (2014). "Choices" and "voices" can promote adaptive goal striving in athletes: A self-determination theory perspective on coach behavior, goal motivation and well-being. *Journal of Sport & Exercise Psychology, 36,* S90-S91. Published Abstract. (Paper presented at the North American Society for the Psychology of Sport and Physical Activity Conference, Minneapolis, June 2014).

2. **Healy, L.C.,** Ntoumanis, N. & Veldhuijzen van Zanten, J.J.C.S. *Coaching behaviours, goal motives, and well- and ill-being: Exploring the bright and dark sides of goal striving*. Paper presented at the British Psychological Society Division of Sport & Exercise Psychology Conference, Manchester, December 2013.
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CHAPTER 1

GENERAL INTRODUCTION

In life, the pursuit of important objectives is not without challenge. Individuals must overcome these challenges in order to be successful in their goal pursuits. Goals are an integral part of daily life, and the links between goals and human behaviour are not novel (Austin & Vancouver, 1996). Indeed, since the work of William James (1890) over a century ago, research in goal setting and goal striving has helped us gain an understanding of how goals can impact cognitive, behavioural and affective outcomes. However, success can be underpinned by a sense of enjoyment in our goal pursuits. Building on recent advances in the goal striving literature, this thesis explores how the motivation underpinning goals can impact goal-related outcomes and well-being.

Goal-Setting Theory

A prominent theory which has received attention with research is goal-setting theory (Locke, 1968; Locke & Latham, 1990, 2002). Originating their work with research in organisational and industrial settings, Locke and Latham (1990) suggested that goal setting can enhance motivation and task performance. Initial studies demonstrated that when individuals used specific, difficult goals on a given task they showed greater performance than those using "do your best" goals (Latham & Baldes, 1975; Latham & Steele, 1983). This effect has consistently been demonstrated across hundreds of studies in a wide range of settings (see Locke & Latham, 2002 for a review).

Goal-setting theory suggests that goals can impact performance through four mechanisms (Locke & Latham, 2002). First, goal setting directs effort and attention towards activities relevant to goal attainment, and away from task-irrelevant activities. For example, in accordance with goal-setting theory, a footballer who sets the goal of improving their passing accuracy in training should be able to focus their effort and attention on this goal, and away from non-goal related activities, such as their shooting accuracy. This effect has been shown

to impact both cognitive (e.g., Rothkopf & Billington, 1979) and behavioural (e.g., Locke & Bryan, 1969) aspects of task involvement.

Second, goals can energise an individual within the task or objective. Within this, it is expected that effort would be greater for high goals than for low goals. As such, if an athlete sets a challenging but achievable goal, the effort they invest in this goal would be higher than if they set an easier, lower level goal.

The third mechanism through which goals can operate is by impacting persistence. Research has shown that hard goals can impact the effort individuals invest in a task (Laporte & Nath, 1976; Latham & Locke, 1975). As such, when an athlete is working for a difficult goal, Locke and Latham (2002) suggest that they would be able to sustain effort towards their goal. Furthermore, their intensity would be impacted by the length of time available to achieve the goal. As such, they might work more intensely for a short-term goal, and less intensely (but for a sustained period) towards a long-term goal.

The final mechanism through which goals impact action is by the adoption or discovery of task-relevant knowledge and strategies. When striving for a goal, individuals will use previously acquired knowledge from prior goal attainment or related contexts to apply to their current situation (Latham & Baldes, 1975). Similarly, in the absence of prior knowledge, individuals will engage in planning to develop effective strategies in an attempt to achieve their goal (Smith, Locke, & Barry, 1990), particularly those with higher self-efficacy (Latham, Winters, & Locke, 1994).

Practical recommendations for goal setting have been made based on the findings of Locke and Latham (2002). For example, Doran (1981) suggested that goals were more effective if they were specific, measurable, attainable, realistic and time-bound (SMART). While this has been widely adopted in goal-setting, Wade (2009) argued that there was

ambiguity over the interpretation of the acronym SMART, and that these goals may not always be appropriate in all settings. More recently, Weinberg and Butt (2014) suggested several principles of effective goal setting which closely align with goal-setting theory (Locke & Latham, 2002). First, individuals should set specific, measurable goals. These goals should be realistic yet challenging. In order to maintain motivation over time, a combination of short- and long-term goals should be employed. Weinberg and Butt also suggested that individuals should make plans of how they are going to reach their goals. Finally, it was suggested that goals should be continually re-evaluated in order to make adjustments to the goal and to maintain motivation.

Goal commitment

Research has identified several moderators of the relationship between goal setting and task performance, of which the most relevant to the present work is goal commitment (Klein, Wesson, Hollenbeck, & Alge, 1999). Goal commitment has been defined as the determination an individual has to reach their goal (Locke & Latham, 1990). Klein et al. (1999) conducted a meta-analysis to explore the relationship between goal commitment and task performance, finding that they were positively related with a moderate effect size. Importantly, they found that this effect could not be attributed to sampling error, and that the effect of goal commitment was stronger when pursing difficult goals, in comparison to moderate and low goals.

Klein et al. (1999) also demonstrated that the level of involvement an individual has in setting their goals can impact goal commitment. Specifically, volition (described as "a voice in the determination of the goal"; p. 890) was found to be the strongest antecedent of goal commitment. This is supported by research on leader-assigned and participative goals (where both the leader and individual engaged in goal striving are active in the goal setting process).

In some situations, people might be able to set their own goals; for example someone might set themselves the goal of losing a specific amount of weight in a given time. At other times, individuals might be assigned goals by someone in a leadership position, for example being set monthly performance targets by a manager. Locke, Latham, and Erez (1988) demonstrated that leader-assigned goals were just as effective as participative goals. However, for assigned goals to be effective (in comparison to participative goals), leaders needed to explain the goal fully rather than just informing the individual of their objectives. In conjunction with the results of the meta-analysis by Klein et al. (1999), these early findings demonstrate it is important that individuals feel ownership over their goals.

Goal-Setting in Sport

Despite the extensive support for goal-setting theory in organisational and industrial settings, most early evidence of effective goal setting in a sport environment was anecdotal. Therefore, Locke and Latham (1985) applied the principles of goal-setting theory to sport, based on their extensive findings from other contexts. Studies show that athletes regularly engaging in goal-setting (Orlick & Partington, 1988), and as such the practical implications of effective goal setting in sport are wide-ranging. However, initial explorations of goal-setting theory to an athletic context provided mixed results. In an attempt to clarify these mixed findings, Kyllo and Landers (1995) conducted a meta-analysis of goal-setting research in sport which addressed three hypotheses all in accordance with Locke and Latham's (1985) recommendations. First, they examined if difficult goals resulted in greater performance than no goals, easy goals or "do your best" goals. Second, they expected that specific goals would lead to higher performance levels than "do your best", general, vague, or no goals. Finally, they hypothesised that a combination of short- and long-term goals would result in more performance gains than only long-term goals. Thirty-six studies (which produced 136 effect

sizes) were examined. While the results showed that overall goal-setting improved performance over “no goal” or “do your best” conditions, only limited supported was found for the hypotheses. Specifically, Kyllo and Landers showed that in a sport context, moderate goals were more effective for performance than difficult goals. Furthermore, specific goals were only more effective than vague or general goals if they focussed on absolute, rather than relative, performance levels. There was, however, support for the third hypothesis, with the results showing that there are greater performance gains when short- and long-term goals are used in combination. Kyllo and Landers suggested that the results be treated with some caution, as their work was based on a rather small selection of studies. Nevertheless, their meta-analysis identifies that the application of goal-setting theory to sport might not fully explain effective practices for athletes trying to achieve important objectives and ultimately improve performance.

Despite equivocal initial findings, several studies have supported goal-setting in sport. Research in sport has also examined other aspects apart from those associated with goal-setting theory. For example, it has been shown that performance and process goals (which focus on measurable levels of performance or improvements in technique and strategies respectively) can be more effective than outcome goals (which focus on distinct performance outcomes such as winning) for performance, as well as cognitive (such as anxiety) and affective (for example, satisfaction) outcomes (Kingston & Hardy, 1997; Pierce & Burton, 1998). Boyce, Wayda, Johnston, Bunker, and Eliot (2001) demonstrated that self-set and instructor-set goals led to greater tennis serve performance in novice tennis players than “do your best” goals. The research has resulted in several recommendations for applied practitioners, coaches and athletes engaging in goal setting (Weinberg, 2013).

Despite the wealth of evidence supporting goal setting, both in sport and other contexts, there are some studies which suggest goal-setting might not be universally beneficial for athletes. Burton, Pickering, Weinberg, Yukelson, and Weigand (2010) investigated the goal-setting practices in a large sample of elite athletes. Participants completed a battery of questionnaires examining the perceived frequency and effectiveness of different goal types, the commitment to their goals and barriers to goal attainment. For goal effectiveness, the researchers examined specific, short-term goals (e.g. "How effective have your weekly goals been in improving your sport performance?"), competitive goals (e.g. "How effective have your outcome goals (i.e. winning, beating an opponent) been in improving your sport performance?") and psychological goals (e.g. "How effective have your goals been in developing and maintaining your motivation?"). A cluster analysis based on athletes' responses to these measures revealed four distinct profiles. These were: disillusioned process goal setters (n = 75), who had low belief in the benefit of short-term and psychological goals but high belief in the effectiveness of competitive goals; disillusioned competitive goal setters (n = 78), who had high belief in the effectiveness of short-term and psychological goals but low belief in the benefit of competitive goals; multifaceted goal setters (n = 123), who had high belief in short-term, psychological and competitive goals; and goal nonbelievers (n = 39), who reported low effectiveness for all three types of goals. Subsequent analyses showed that disillusioned process goal setters reported lower career athletic success than both the multifaceted and disillusioned competitive goal setters. There were also differences between the groups in their level of goal commitment, and the frequency with which they set goals. Furthermore, the multifaceted goal setters and goal nonbelievers were significantly higher and lower respectively in trait sport confidence than all other groups. While 40% of the participants reported being highly committed to goal setting

and believed a range of goals to be effective, the remaining participants felt that at least one aspect of their goal setting was ineffective, and were not as committed to all of their goals. This study demonstrates that there may be individual differences which impact goal commitment and effectiveness. It is possible that these differences could be the result of the underlying motivation that athletes have for their goals; that is the reasons they are striving to reach their objectives and aims.

Goal setting and motivation

As outlined in goal-setting theory, Locke and Latham (2002) suggested that goal setting can enhance motivation for goals. Indeed, in their examination of several theories of goal setting and goal striving, Webb and Sheeran (2005) identified that success in achieving goals was associated with high levels of motivation and commitment to the goal. They expressed motivation to reflect "the strength of a person's decision to achieve a goal" (pp. 89-90) which underlies the intention to pursue the goal, as well as the commitment and cognitive attitudes associated with the goal.

As demonstrated in the literature covered thus far, the majority of research has focussed on the "whats" of goal striving; that is aspects of goal setting which might be more effective and lead to greater levels of goal attainment. Until recently, the motivation underpinning goal striving, the "whys" of goal pursuit, has not been fully explored in relation to goal attainment. Given the volition in goal striving has been shown to impact goal commitment (Klein et al., 1999), it is possible that differentiating between the motivational consequences of goal setting, and the motivation underpinning goal striving could explain why some individuals are more successful in their goal pursuits (Deci & Ryan, 2000; Sheldon & Elliot, 1999).

The Self-Concordance Model

Addressing this limitation in the literature, Sheldon and Elliot (1999) proposed the Self-Concordance Model (SC model). Grounded in Self-Determination Theory (SDT; Deci & Ryan, 2000), the SC model is concerned with the motivation an individual has for their goal when they commence goal striving; essentially the reasons why they are working towards their goal. While individuals may freely choose to work towards their goals, their motives for goal striving might not always be integrated with their personal values and interests (Sheldon & Elliot, 1998). When an individual is more self-concordant in their goal motivation, that is striving for goals for intrinsic enjoyment or identified benefits, Sheldon and Elliot (1999) suggest that this will have positive benefits for both goal attainment and well-being.

Within the SC model Sheldon and Elliot (1999) identify two broad types of goal motivation; autonomous and controlled. Autonomous motives are reflective of intrinsic and identified motivation regulations (Deci & Ryan, 2000). As such, when striving with autonomous motives, individuals are doing so as a result of the perceived enjoyment or importance associated with the goal. These goals are likely to align with an individual's self-concept and personal values, and are within the control of the individual. Thus, when they strive with autonomous motives, individuals are likely to feel that they have freely chosen to pursue the goal. Conversely, controlled motives are underpinned by pressures and are less integrated with core values and interests, representing extrinsic or introjected motivation regulations. For example, a coach might set a goal with her athletes to complete a fitness training programme in addition to their technical training. Some athletes may strive for this goal with autonomous motives, as they understand that improving their fitness levels might enhance their overall performance. On the other hand, some athletes might have controlled motives for goal pursuit, as they perceive that their coach expects them to achieve the goal,

and would feel guilty if they did not engage in the fitness programme. Given the difference in the sense of volition between these two types of motives, it is likely that they will result in different levels of effort towards a goal (Gollwitzer, 1990). Indeed, Sheldon and Elliot demonstrated that greater goal self-concordance (that is higher autonomous and lower controlled goal motives) is related to higher levels of effort and greater levels of goal attainment.

As shown in Figure 1.1, the SC model is not simply concerned with factors relating to goal striving and attainment; Sheldon and Elliot (1999) also make predictions surrounding how goal attainment might be associated with well-being. The model is thus split into two sections; goal striving and goal attainment. The goal striving section is concerned with the relations between goal motivation, effort and goal attainment, whereby greater self-concordance is associated with sustained effort towards the goal, and ultimately greater levels of goal attainment. Within the goal attainment part of the model, Sheldon and Elliot attempt to explain how goal attainment might lead to changes in well-being through the satisfaction of the basic psychological needs (autonomy, relatedness, competence). As such, when individuals strive with autonomous motives which are more aligned with their values, they are likely to experience benefits not only for goal attainment but also their psychological well-being (for example, greater positive affect). A final aspect of the model as proposed by Sheldon and Elliot is that the satisfaction of the basic psychological needs would be directly predicted by the interaction between goal self-concordance and goal attainment. That is, for individuals to experience psychological growth as a result of successful goal attainment, they need to have higher autonomous motives when they embark on goal striving. In other words, if an individual successfully attains a goal which is underpinned by controlled motivation, it is unlikely that they will experience positive psychological outcomes such as need satisfaction

or enhanced well-being. This notion is not dissimilar to the suggestions of William James (1890), who postulated that when an area is of personal importance to an individual, the more likely it will be that feelings of competence in that domain will link to the individual's feelings of self-esteem.

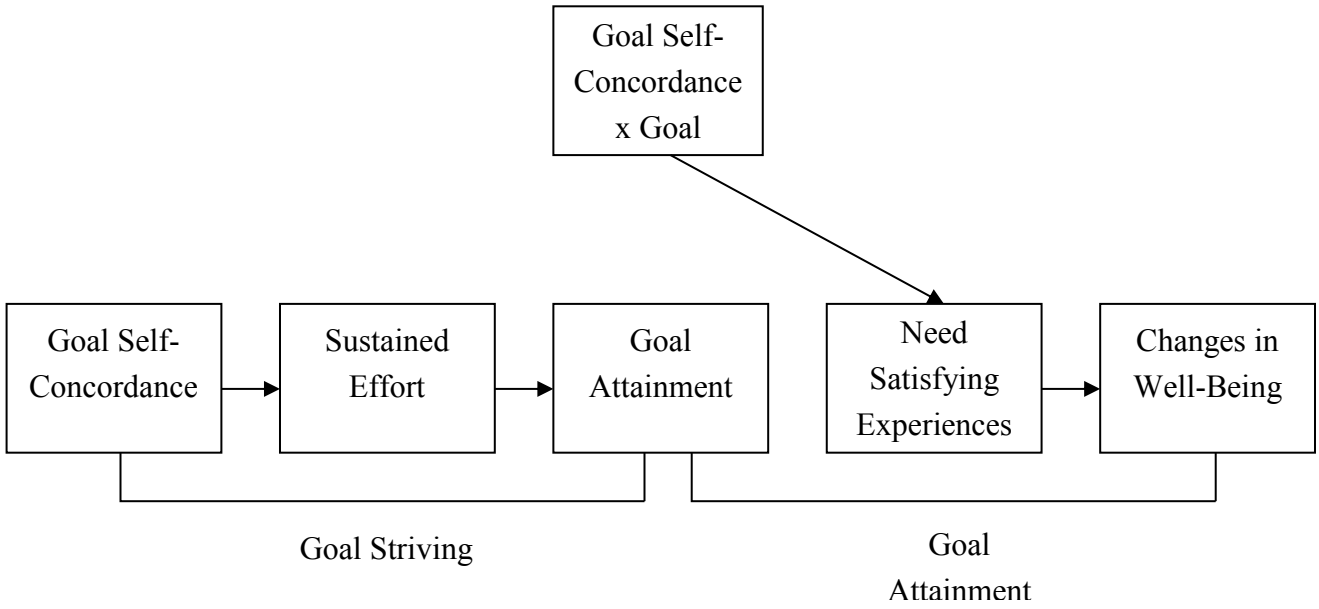

Figure 1.1. The Self-Concordance Model (Sheldon & Elliot, 1999).

Empirical research has generally found support for the SC model. Sheldon and Elliot (1999) tested the model in three studies using longitudinal data, and found support for both the goal striving (Study 1) and goal attainment (Study 2) parts of the model, as well as the full model encompassing both sections (Study 3). Additionally, research conducted in a variety of achievement settings has provided further evidence to support the initial findings. For example, Judge, Bono, Erez, and Locke (2005; Study 1) found that university undergraduates had greater satisfaction with life and higher levels of goal attainment if they were pursuing self-concordant goals. Similarly when examining effort and progress in the transition to university, Vasalampi, Nurmi, Jokisaari, and Salmela-Aro (2012) demonstrated that

secondary school students who had higher autonomous motivation for their educational goals reported higher levels of goal effort and goal progress, which resulted in them being more likely to pass a challenging university entrance exam. Furthermore, studies which explored goal motivation, educational goal attainment or progress, and well-being over time again supported the major propositions of the SC model (Carraro & Gaudreau, 2011; Sheldon & Houser-Marko, 2001). There have also been applications of the SC model in business settings. Within this context, Judge et al. (2005; Study 2) illustrated that self-concordant goal pursuit was related to job satisfaction and goal attainment in employees of three companies in the United States. Koestner, Lekes, Powers, and Chicoine (2002) showed that higher levels of goal self-concordance were associated with greater progress for goals set over a weekend and for New Year's resolutions.

Sheldon and Elliot's (1999) major propositions regarding the SC model have also been supported by the findings of meta-analyses. Koestner et al. (2002) examined seven studies and found a highly significant moderate effect size between goal self-concordance and goal progress. A further analysis of nine studies discovered a large effect size between goal progress and enhanced well-being. A more sophisticated meta-analysis by Gaudreau, Carraro, and Miranda (2012) demonstrated that the relation between goal self-concordance and goal progress was mediated by self-regulation (e.g. effort expenditure). These findings support the SC model literature regarding the advantages of striving with higher autonomous, and lower controlled goal motives.

While the original SC model research examined overall goal self-concordance in relation to goal attainment, other studies have suggested that this method may be problematic. For example, based on the SC model (and the wider SDT-based research) it would be expected that autonomous and controlled goal motivation would be negatively related to each

other, and would have opposite links with goal-related outcomes (i.e. autonomous motives positively and controlled motives negatively associated with goal attainment and well-being). However, Judge et al. (2005) failed to support this; with the two motives being positively but not significantly associated, and only autonomous motives being positively related to goal-related outcomes. Based on these somewhat unexpected findings, Koestner, Otis, Powers, Pelletier, and Gagnon (2008) conducted three studies which separated goal self-concordance into autonomous and controlled goal motivation to examine goal progress. Based on the previous research (e.g., Judge et al., 2005), they expected that autonomous, but not controlled, goal motives would predict goal progress after one month. The findings supported their hypothesis, as autonomous goal motives positively predicted goal progress in all three studies, including one study which incorporated objectively measured goal progress. In all three studies, controlled goal motives were unrelated to goal progress. Supporting these findings, a further meta-analysis by Gaudreau et al. (2012) again showed that the autonomous goal motives led to goal progress through self-regulation, whereas controlled goal motives were unrelated to both of these variables. Overall, the literature demonstrates in a variety of achievement-oriented contexts the advantages which individuals will experience when they pursue goals for autonomous reasons.

There are also studies which have not directly tested the SC model, but the results of which do support Sheldon and Elliot's (1999) predictions. For instance, Shahar, Kalnitzki, Shulman, and Blatt (2006) examined the motivational underpinnings of goal construction in young adults during the transition to adulthood. Specifically, they explored intrinsic and extrinsic goal motivation using items similar to those used in SC model research. Their findings identified that goal related intrinsic motivation was related to goal investment (assessed by goal importance and commitment), present goal progress and future goal

expectations (consisting of the extent to which individuals felt the goal would be achieved and was under their control). Conversely, goal related extrinsic motivation was unrelated to goal outcomes. These findings, although not a direct test of the SC model, provide further support to the notion that the underlying motivation for goal pursuit might explain individual differences in goal progress and well-being.

Examining the SC Model in Sport

A sport setting has also been used to test the predictions of the SC model. As an achievement-driven environment, within which the setting and pursuit of important goals is routine (Weinberg & Butt, 2011), it seems appropriate to explore the role of motivation when athletes are working towards their objectives. Indeed, a growing body of research has provided support for the model when applied in a sporting context. In the initial application of the SC model to sport using a cross-sectional data, Smith, Ntoumanis and Duda (2007) examined autonomous and controlled motives separately (as opposed to an overall self-concordance value) in relation to goal attainment and well-being. Supporting prior research (e.g., Koestner et al., 2002; Koestner et al., 2008), the two types of goal motivation were found to be unrelated. When testing the SC model, Smith et al. (2007) found that autonomous motives were related to increased effort, which in turn was related to higher levels of perceived goal attainment. Furthermore, goal attainment was related to need satisfaction, which was associated with greater relative well-being. Controlled motives were unrelated to effort or goal progress (supporting prior work from non-sport contexts), but were negatively associated with relative well-being.

Further work by Smith, Ntoumanis, Duda and Vansteenkiste (2011) tested the SC model over the course of a competitive sport season. Within this study, autonomous motives at the beginning of the season predicted goal directed effort at the midseason point, which

predicted higher perceptions of goal attainment at the end of the season. Furthermore, goal attainment was related to well-being through the satisfaction of the basis psychological needs (when controlling for need satisfaction and well-being at the beginning of the season). Controlled goal motives were expected to be negatively associated with well-being, however the results found that they were unrelated to any of the measured constructs. In further support of Sheldon and Elliot's (1999) model (and in contrast to the findings of Smith et al., 2007) need satisfaction at the end of the season was also predicted by the interaction between autonomous motives and goal attainment. Specifically, when individuals reported higher goal attainment but relatively low autonomous motives, they did not experience benefits for need satisfaction, whereas those who were striving with higher autonomous motives and reported high goal attainment also reported higher need satisfaction. This supported Sheldon and Elliot's suggestion that the psychological growth associated with goal attainment only occurs as a result of striving with autonomous motives.

In addition to exploring the SC model over time, Smith et al. (2011) expanded the model to include coping strategies. This was based on work which had linked autonomous and controlled general motivation for sport participation to task- and disengagement-oriented coping respectively (Amiot, Gaudreau, & Blanchard, 2004; Gaudreau & Antl, 2008). When these were incorporated into the SC model, Smith et al. (2011) demonstrated that the relation between autonomous goal motives and goal directed effort was mediated by higher levels of planning and instrumental support, which are examples of task-oriented coping. While controlled motives remained unrelated to goal directed effort, the latter was related to cognitive and behavioural disengagement. These additions to the SC model demonstrate not only that autonomous motives are related to sustained effort as suggested by Sheldon and

Elliot (1999), but also how individuals striving with these motives might adopt more adaptive strategies in pursuit of their goal.

The notion that those striving with autonomous motives might adopt more adaptive coping strategies is supported by several other studies. For instance, Gaudreau et al. (2012) demonstrated in two studies that autonomous and controlled goal motivation were related to task- and disengagement-oriented coping strategies respectively. Further, task-oriented coping strategies mediated the relationship between autonomous goal motives and goal progress. Further work by Ntoumanis, Healy, Sedikides, Duda, et al. (2014, Study 1) also supported the link between goal motives and coping strategies. This study extended the SC model literature by utilising a laboratory protocol. The advantage of this approach was that persistence towards a goal could be objectively measured, whereas previous work had relied on self-report measures of goal attainment. Participants completed a multi-stage cycling trial where the resistance increased every 2 minutes; as such participants were required to expend increasing amounts of effort in order to achieve higher levels of goal attainment. In addition to autonomous and controlled goal motives being associated with different coping strategies, Ntoumanis, Healy, Sedikides, Duda et al. expected this relation to be mediated by how individuals appraised the task. Based on the transactional model of stress (Lazarus & Folkman, 1984) and work associating motivation and coping (Ntoumanis, Edmunds, & Duda, 2009; Skinner & Edge, 2002), the authors tested a model whereby autonomous motives would be related to higher persistence through challenge appraisals and effort-based coping. Conversely, those striving with controlled motives would be more likely to appraise the task as a threat and employ disengagement-based coping, which would result in lower persistence towards the goal. The results supported the hypothesised model. Furthermore, additional analyses showed that higher autonomous motives were associated with a higher heart rate at

the end of trial; essentially demonstrating that individuals striving with autonomous motives were prepared to work a higher intensity in order to achieve higher levels of goal attainment.

Other studies conducted in a sporting context offer support to the aspects of the SC model. In their initial presentation of the SC model, Sheldon and Elliot (1999) suggested that goals pursued with autonomous motives tend to have an internal locus of causality, as they originate from self-choices and are associated with an individual's interests and values. This is supported by research (Lambert, Moore, & Dixon, 1999) which suggests when athletes are allowed to set their own goals, those with an internal locus of control (conceptualised as an individual's perception of being able to control what happens to him/herself) displayed higher persistence towards the goal than athletes with an external locus of control. Interestingly, the findings were reversed when the goals were set by coaches, whereby athletes with an external locus of control persisted for longer in pursuit of their goal. These findings suggest that behaviour of a coach may interact with the motivation of an individual in pursuit of important goals. However, the results should be interpreted with caution, as the study only included four participants. Consequently, the data were not tested statistically. Furthermore, the authors suggest that it would be beneficial for coaches and practitioners to assess an individual's locus of control, and subsequently set goals based on these values. This is somewhat contradictory to the fundamental principles of the SC model and wider SDT-based research, which would suggest that motivation regulations are not fixed, but can be adapted based on the social environment. As such, it could be argued that all individuals would be able to strive with higher autonomous motives (and an internal locus of control) if exposed to optimum conditions. Despite these limitations, Lambert et al. (1999) provide further support to the notion that when athletes perceive higher control over their goals, they will demonstrate greater persistence towards important objectives.

The studies described above demonstrate the adaptive nature of autonomous motives for goal pursuit, and the channels through which these motives operate in order to lead to greater goal attainment. There are, however, areas within the SC model literature which require further attention. One such area is influence of contextual factors on individuals' goal motivation.

Contextual factors and goal motivation

Research on the SC model has thus far, to the best of our knowledge, only examined self-reported personal goal motives in relation to goal attainment and well-being. That is, studies have not manipulated motivation in a specific goal to see if the self-report findings can be replicated. Recent advances in the literature have demonstrated that goals can be activated and pursued outside of conscious awareness (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Trotschel, 2001; Custers & Aarts, 2010). Studies have also supported the goal contagion hypothesis, whereby goals may be pursued following exposure to another individual striving for a similar goal (Aarts, Gollwitzer, & Hassin, 2004). Shteynberg and Galinsky (2011) showed that goal pursuit can be intensified by the awareness that another individual is pursing the same goal. These studies suggest that while goal setting might be a conscious, purposeful activity for some individuals and in some situations, there may be instances where goal pursuit occurs as a result of external, unconscious interferences.

Additionally, Levesque, Copeland, and Sutcliffe (2008) found that the motivational processes proposed by SDT can occur outside of an individual's conscious awareness. By examining the SDT literature we can see several examples of general motivation being successfully primed. For example, Hodgins, Yacko, and Gottlieb (2006) utilised a sentence scrambling technique to prime motivational orientations (autonomy, control, impersonal). In three tasks differences were found between the prime conditions on a range of dependent

variables. Ratelle, Baldwin, and Vallerand (2005) found that intrinsic motivation was impacted by the presence of controlling feedback. Furthermore, when motivation was manipulated using subliminal priming techniques studies have shown differences in performance in line with the principles of SDT (Radel, Sarrazin, Legrain, & Gobance, 2009; Radel, Sarrazin, & Pelletier, 2009). Despite these findings from the wider motivation literature, studies investigating the SC model are yet to take advantage of these techniques to prime motivation for a specific goal. Thus, this is one of the aims of this thesis; to investigate how primed goal motives might be related to goal self-regulation in a sporting context.

While goal motivation has not been experimentally primed within the SC model literature, studies have examined the social-contextual antecedents of goal motivation. Specifically, there have been attempts to examine how coach behaviours might impact an athlete's motivation for their goals. Within the SDT framework, it is generally accepted that two examples of coach behaviours are autonomy-supportive or controlling behaviours (Deci & Ryan, 2000). When a coach uses autonomy-supportive behaviours, they provide rationale for activities, offer athletes choices regarding their participation, allow athletes the opportunity to take the initiative and prevent ego-involvement in their athletes (Black & Deci, 2000; Mageau & Vallerand, 2003). On the other hand, when coaches are more controlling, they adopt coercive behaviours to influence athletes. This might include the use of negative conditional regard or extrinsic reward to gain compliance (Bartholomew, Ntoumanis, & Thogersen-Ntoumani, 2009). Autonomy-supportive behaviours have consistently been linked with positive outcomes for motivation and well-being (Deci & Ryan, 2000). More recently researchers have explored the nature of controlling coaching behaviours (Bartholomew et al., 2009), and the Coach Controlling Behaviors Scale (CCBS; Bartholomew, Ntoumanis, & Thogersen-Ntoumani, 2010) was developed to assess athletes' perspectives of this within their

sport experience. Research incorporating the CCBS has shown how controlling coaching might undermine factors contributing to self-determined motivation and lead to negative consequences for well-being (e.g., Balaguer et al., 2012).

The original SC model as proposed by Sheldon and Elliot (1999) did not specify the effect of any contextual factors. Furthermore, within the SC model research the links between coaching behaviours and goal motivation are unclear, as studies have found contrasting results. In one of the first studies on the SC model to incorporate contextual factors, Smith et al. (2007) demonstrated that autonomy-supportive coach behaviours were associated with higher levels of autonomous goal motives in athletes. This was supported by further work which linked autonomy-supportive and controlling coach behaviours to autonomous and controlled goal motives respectively (Smith, Ntoumanis, & Duda, 2010). However, this latter study did not incorporate the CCBS (Bartholomew et al., 2010) to assess the controlling aspects of coach behaviour. Furthermore, a more recent investigation examining these factors found no support for a link between autonomy-supportive behaviours and autonomous motives (Smith et al., 2011). As such we aimed to investigate these variables further within the research presented in this thesis. As well as having the potential to clarify the mixed findings within the literature, the aim has strong applied implications. For example, if coaches can understand how to best support athletes engaged in goal striving it may lead to positive outcomes for goal attainment and ultimately performance.

Beyond Goal Attainment

As discussed already within the context of this chapter, SC model research has consistently linked autonomous goal motives with higher levels of goal attainment. Additionally, several studies have shown different relations with both hedonic and eudaimonic well-being depending on the level of self-determination of an individual's goal

motives. For example, Smith and colleagues (2010) found autonomous and controlled goal motives to be positively and negatively related to relative well-being respectively. Earlier work by Smith et al. (2007) showed autonomous motives to be positively related to well-being (albeit indirectly through effort, goal attainment and need satisfaction in line with the SC model), whereas controlled motives were directly and negatively related to well-being. In both of these studies, the measures of ill-being (e.g. negative affect, burnout) were subtracted from the well-being measures (e.g. satisfaction with life, positive affect) to create an overall measure of well-being. This may be considered a limitation, as it does not allow the exploration of the independent relations between goal motives, and well- and ill-being. It has been suggested that while autonomous goal motives are positively connected with positive outcomes, it cannot be assumed that controlled goal motives are negatively related to the same outcomes (Koestner et al., 2008), with studies often showing no relation between the latter two variables (e.g., Judge et al., 2005). It could be expected, however, that controlled goal motives are directly related to negative outcomes. As such, using a relative well-being index may mask these relations. We therefore explored the independent effects of autonomous and controlled goal motives on individual markers of well- and ill-being.

Furthermore, the SC model research in sport has exclusively looked at psychological well-being. There has been work in other contexts which have examined other indicators of this construct. For instance, Miquelon and Vallerand (2006) demonstrated that autonomous goal motives were positively related to self-realisation (an indicator of eudaimonic well-being), which in turn was negatively related to physical symptoms of ill-being. This suggests that autonomously motivated strivings might have positive consequences for physical, as well as psychological, health. Work in the wider SDT literature has also linked motivational processes with biological markers of ill-being, such as cortisol (Quested et al., 2011) and

secretary immunoglobin-A (S-IgA; Bartholomew, Ntoumanis, Ryan, Bosch, & Thogersen-Ntoumani, 2011a). Again, such markers are yet to be explored with regard to autonomous and controlled goal motives. Given the broad and multi-dimensional nature of well-being, it seems pertinent to expand the SC model research to examine other indicators of this construct.

A further limitation of the SC model literature is that research, to the best of our knowledge, has not looked at outcomes beyond goal attainment and well-being. Work by Sheldon and Houser-Marko (2001) demonstrated how initial goal self-concordance could lead to overall goal attainment, through sub-goal attainment and the subsequent change in goal self-concordance. However in these studies, the sub-goals were all related to the same overall outcome. What is missing from the SC model literature is how goal motivation and goal attainment might impact intentions to undertake, or behaviour towards future goals. We could expect, for instance, that when individuals attain goals which are underpinned by autonomous motives, the associated benefits for positive affect might lead to higher interest in similar but unrelated goal pursuits. This is based on work by Haase, Poulin, and Heckhausen (2012) which suggested that positive affect can impact the effort and time individuals invest in their goal pursuits. As such, we might expect that those who attain their goals experience benefits for well-being, the outcome of which is greater intentions to pursue other important goals.

In addition to understanding how adaptive strivings and goal attainment might impact future intentions and behaviour, there is another aspect of goal self-regulation which should be considered. Goal pursuit is rarely without challenges, and there may be situations where the result of striving is failure rather than goal attainment. How individuals respond to this failure experience is important in the effective self-regulation of goals in both the short-term and over their lifespan.

It is also important to understand how individuals might behave after they experience failures in goal striving. It has been suggested that even when an individual has started to work towards new objectives, processes associated with a previous goal failure may continue to operate (Smallwood & Schooler, 2006), which may have consequences for the success of these new strivings. Indeed Masicampo and Baumeister (2011a) found that unfulfilled goals could interfere with tasks involving executive function, which is "a higher order cognitive ability that controls basic and underlying cognitive function for purposeful, goal-directed behaviour" (Etnier & Chang, 2009, p.470). However, as elucidated by Masicampo and Baumeister, the literature has not fully explored if these findings are impacted by individual differences. In their own studies, Masicampo and Baumeister found that the impact of an unfulfilled goal on executive function was moderated by an individual's dispositional goal tenacity (defined as the degree to which individuals generally persist in pursuing goals all the way to completion). Other work investigating the impact of goal failure found that subsequent performance was dependent on the extent to which the task was related to self-definition (how an individual defines themselves; Brunstein & Gollwitzer, 1996). Given that autonomous motives are more aligned with the self and personally important values, and are consistently associated with sustained effort, it seems reasonable to suggest that motivation for the initial, unfulfilled goal might be crucial in determining the responses to such situations. The findings of Ntoumanis, Healy, Sedikides, Smith, and Duda (2014) relating motivation to disengagement from an unattainable goal further strengthen this rationale. Thus within the context of this thesis, we explored the extent to which autonomous and controlled goal motives moderate responses to goal failure.

Multiple Goal Striving

In addition to the aforementioned limitations, the SC model research has generally only explored how motivation impacts the processes and progress towards one primary goal. The reality, is that individuals are constantly trying to balance important goals across several domains (e.g., work, social, health and well-being; Louro, Pieters, & Zeelenberg, 2007). Emmons and King (1988) explored conflict within the personal strivings of university undergraduates, and showed that the levels of conflict experienced led to differences in the amount of time thinking about their goals, their behaviour towards their goals and affective outcomes. Riediger and Freund (2004) advanced this work by exploring inter-goal facilitation and interference. They defined inter-goal facilitation as "when the pursuit of one goal increases the likelihood of success in reaching another goal" (p. 1511). This may be through instrumental relations (where progress in one goal results in simultaneous progress towards another important goal) or overlapping goal attainment strategies (when one action has positive outcomes for both goals). On the other hand, inter-goal interference is when pursuing one goal reduces the probability of experiencing success in another goal. This may operate through resource constraints (where attending to one goal might detract time, effort or other resources away from another goal) or incompatible goal attainment strategies (where the strategy for completing one goal is in conflict with another goal). Riediger and Freund's research showed that individuals who report higher inter-goal interference also reported lower levels of subjective well-being. Conversely, inter-goal facilitation was related to higher levels of goal pursuit (measured through self-report measures exploring goal-related cognitions, perceptions and behaviours). However, the role that goal motivation might play in impacting either facilitation or interference has not been explored within the literature. Given that goals underpinned by autonomous motives are more aligned with personal values and interests, it is

plausible that individuals would experience less conflict between concurrent goals that they are striving for across domains. Similarly, it could be that those individuals who experience a motivational conflict in their goal pursuits (that is, pursuing one goal with autonomous and another goal with controlled motives), or those with high controlled motives for both goals might also report higher interference in their strivings. Understanding how motivation might impact the self-regulation of multiple goals would have wide implications for those engaged in goal pursuit across several achievement environments, such as education, work, and sport.

Summary and Impetus for Research Programme

A growing body of research has found support for the SC model, and presented some of the processes through which autonomous goal motives can facilitate goal attainment and personal growth. There are, however, some questions which remained unexplored. For example, the literature has yet to explore the positive and negative impact of contextual factors on goal motives and persistence. Furthermore, there has been a reliance on self-report measures to assess persistence, goal attainment and other outcomes of goal striving such as well- and ill-being. Finally, SC model research has predominately investigated striving for a single goal, and not examined the impact of goal motives in multiple goal striving. As such, drawing from the SC model and goal self-regulation literatures, the present research had four primary aims:

1. To examine the impact of experimentally primed (as opposed to personal) motives on objective goal persistence and well-being;
2. To explore how primed goal motives might interact with perceptions of goal attainment to impact performance in future goal strivings;
3. To clarify the relations between social-psychological factors, goal motives, goal attainment, and well- and ill-being;

4. To investigate how goal motives are associated with inter-goal relations when simultaneously striving for multiple goals.

We explored these aims through several empirical studies. We used sport as a context for our research, given that this is an achievement-driven environment where goal-setting and striving are commonplace (Weinberg, 2013). Based on the literature, our central hypothesis was that autonomous motives would be more adaptive than controlled motives, resulting in greater outcomes for goal attainment, well-being and future goal striving.

Chapter 2 examined the impact of a contextual prime on goal persistence in a laboratory setting. Specifically, we replicated and extended the work of Ntoumanis, Healy, Sedikides, Duda, et al. (2014, Study 1) using experimentally manipulated goal motives. We also examined how primed goal motives could impact well-being and interest in future engagement.

Chapter 3 also utilised primed goal motives to explore how motivation and the outcome of goal striving might interact to impact behavioural responses. In a laboratory setting, we used manipulated feedback in order to create different perceptions of goal attainment. This allowed us to explore how primed motives and perceptions of goal success or failure might interact to impact subsequent task performance.

The research presented in Chapter 4 explored how the social-psychological environment could impact goal motives and well-being in team sport athletes. Specifically, we blended the SC model with the hierarchical model of motivation (Mageau & Vallerand, 2003; Vallerand, 1997) in an attempt to clarify the somewhat contradictory findings of previous literature exploring coach behaviours and goal motivation. We also incorporated recently developed measures to assess the darker side of athletic experience, such as controlling coach behaviours and the thwarting of the basic psychological needs. Moreover,

we examined aspects of well- and ill-being which thus far have been overlooked in the SC model literature (e.g. physical and psychobiological ill-being). Additionally, within this study we examine how the change in autonomous and controlled goal motives over the course of a competitive sport season might be related to goal attainment.

In the final empirical chapter we explore how goal motivation might relate to inter-goal relations when individuals are working towards multiple goals across domains. The research presented in Chapter 5 examines university student athletes, who identified their most important sporting and academic goal for the academic year, and rated their autonomous and controlled motivation for these goals. They also reported their inter-goal relations, in terms of facilitation and interference between the goals.

CHAPTER 2

ROLE OF CONTEXTUAL PRIMING ON GOAL PERSISTENCE AND WELL-BEING

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Abstract

No prior research has examined how motivation for goal striving can be experimentally manipulated. This study examined the role of primed autonomous and controlled motives in predicting objectively-assessed persistence during the pursuit of an increasingly difficult goal. Ninety British athletes (43 males; *M*age = 19.63 years, *SD*age = 1.14) pursued a goal of increasing difficulty on a cycle-ergometer. Their motivation was primed by asking them to observe a video of an actor describing her/his involvement in an unrelated study. In addition to persistence, we examined the impact on well-being and interest in future goal striving. Structural equation modelling supported a model where primed autonomous (compared to controlled) goal motives predicted greater persistence, positive affect, and future interest for task engagement. The findings underscore the importance of autonomous motivation for behavioural investment in the face of increased goal difficulty.

Key words: Goal persistence, goal motivation, priming, self-concordance, well-being

Introduction

Whether it is to perform well in an exam, to maintain physical health, or to stay ahead of the competition, goals form an integral part of daily life. Factors related to goal striving, such as how goals are activated (Fishbach & Ferguson, 2007), operate (Locke & Latham, 2002), are monitored (Zimmerman & Paulsen, 1995), and are guided by motives (Sheldon & Elliot, 1999), have been extensively examined within the literature. When proposing the Self-Concordance (SC) model, Sheldon and Elliot (1999) suggested that goal motives can be autonomous (based on personal interest, enjoyment, or perceived importance) or controlled (driven by internal or external pressures and contingencies related to social approval). The SC model is grounded in Self-Determination Theory (SDT; Deci & Ryan, 1985, 2000), and Sheldon and Elliot predict that individuals striving with higher autonomous goal motives will sustain effort in goal pursuit, resulting in higher levels of goal attainment. Empirical evidence has provided support for the model, with Sheldon and Elliot (1999) and Sheldon and Houser-Marko (2001) showing that autonomous reasons for the pursuit of academic goals related over time to goal attainment and well-being. Koestner et al. (2002) also showed a positive relation between autonomous goal motivation and monthly progress on New Year's resolutions.

Although the advantages of autonomous motivation in mobilising and allocating goal-related resources have been well-documented (Sheldon, 2008), goal pursuit is rarely without its challenges. Some goals are of fixed difficulty (e.g., achieving a certain grade in an academic exam). For other goals, difficulty may fluctuate over time (e.g., keeping oneself in good physical condition). For yet another category of goals, especially in achievement settings, difficulty can increase over time (e.g., staying ahead of the competition, being innovative). Ntoumanis, Healy, Sedikides, Duda, et al. (2014, Study 1) explored how an individual's personal goal motives predicted persistence towards an increasingly difficult goal

in a multi-stage cycling trial. The results showed that greater goal persistence was predicted by autonomous motives. This effect was mediated through individuals appraising the task as a challenge, and in turn employing greater effort as a coping strategy. Controlled motives predicted greater threat appraisals and consequently individuals reported higher levels of disengagement coping, and displayed lower persistence. These findings support and extend previous cross-sectional and longitudinal work examining goal motives in sport (Smith et al., 2007; Smith et al., 2011), showing that autonomous motives lead to more adaptive goal strivings and greater positive outcomes, both for persistence and well-being. Sport is an achievement-driven environment, where the setting, pursuit, and regulation of goals is common place (Weinberg, 2013) and where perceptions of success are enhanced by evidence of triumph over mounting adversity (Goss, 1999). When striving to stay ahead of competition in sport, goal difficulty often increases over time (e.g., over a season or even within a competition; Johnson, 2011). Given the nature of the sporting environment, and the previous findings of studies investigating goal striving in sport, it seems appropriate that we used this context for the present study.

To the best of our knowledge, studies within the goal striving literature have thus far relied on personal (self-reported) goal motivation, and goal motives have yet to be experimentally manipulated. Within the wider SDT literature, there have been successful examples of general motivation priming (Hodgins et al., 2006; Levesque et al., 2008; Radel, Sarrazin, & Pelletier, 2009; Ratelle, Baldwin et al., 2005). Studies have employed a variety of techniques, such as sentence scrambling (Hodgins et al., 2006) and subliminal priming (Radel et al., 2009). However, these methods do not easily translate to a sporting environment, as they would not naturally occur in training or competition. As such, we feel that the previously employed motivational priming techniques lack ecological validity for sport-based research.

A notable exception is work by Friedman, Deci, Elliot, Moller, and Aarts (2010), in which participants' motivational orientation was successfully primed using a confederate who appeared to be motivated in either an autonomous or controlled way. Within the context of the present study, we considered the use of a confederate; however, this was impractical and thus we instead used a video. Video use ensures that the prime is consistent across participants. This technique is considered to be a mindset prime (Bargh & Chartrand, 2000; Gollwitzer, 1990), whereby participants are exposed to a goal-directed thought (in the present study the motivation for a goal), which is more likely to subsequently operate in a different, unrelated context. Furthermore, while athletes often speak anecdotally of how their motivation can be influenced by role models they see on television, this possibility has not been explored by sports motivation research. Essentially, we aimed to prime a contextual factor to influence an athlete's motivation for their goal. We primed autonomous and controlled motivation as well as a neutral condition with no motivational content. We included the neutral condition in order to be able to compare across conditions both the positive effects of autonomous motives, and the negative effects of controlled motives, on goal pursuit. Thus, our first aim in this study was to investigate the effect of primed goal motives towards an increasingly difficult goal.

The work by Ntoumanis, Healy, Sedikides, Duda, et al. (2014; Study 1) demonstrated the channels through which goal motives impact persistence (for example, task appraisals and coping strategies). However, research has yet to address outcomes of goal motivation beyond persistence when striving for an increasingly difficult goal. Prior SC model research has demonstrated that autonomous goal motives lead to greater psychological well-being, mediated through the satisfaction of the basic psychological needs (Sheldon & Elliot, 1999; Smith et al., 2007; Smith et al., 2011). Based on these findings, it could be expected that

successful goal pursuit (as facilitated by more autonomous strivings) would lead to greater outcomes for psychological well-being (i.e., positive affect). Furthermore, greater levels of positive affect could lead to interest in future goal engagement, given previous findings suggesting that positive affect can motivate individuals to invest time and effort into their goals (Haase et al., 2012). Given that autonomous goal pursuit is regulated through interest (Ryan & Deci, 2000) it is probable that autonomous motivation would lead not only to increased goal persistence, but also directly to interest in future goal engagement. This formulated our second aim in the present study; to investigate how goal motives could impact positive affect and interest in future goal engagement via greater goal persistence.

Purpose and Hypotheses

In summary, our study had two aims. First, we aimed to replicate the findings of Ntoumanis, Healy, Sedikides, Duda, et al. (2014; Study 1) using a priming method appropriate for a sporting environment. We hypothesised that primed autonomous and neutral goal motives would lead to greater persistence towards a goal in a cycling task compared to primed controlled motives. Secondly, we investigated the role of goal motivation in predicting outcomes beyond persistence. We expected that persistence would positively predict both positive affect and future interest, the latter of which would also be directly predicted by the autonomous prime. Finally, we anticipated that persistence would predict future interest indirectly through positive affect.

Method

Participants

Ninety athletes (43 male, 47 female; *M*age = 19.63 years, *SD*age = 1.14) from various sports (except cycling and triathlon to avoid inclusion of participants with experience in cycling events of increasing difficulty) participated for course credit or financial reward (£5). These athletes were recruited from students at a British university, and trained on average 4.58 hours every week (*SD* = 2.91).

Procedure

Participants completed the study individually in a single 1-hour session. They were asked to report to the laboratory having avoided strenuous exercise for 24 hours, and also food, alcohol, caffeine, and tobacco for three hours prior to their participation. On arrival, participants were fitted with a heart rate (HR) monitor to record resting HR, before they completed consent forms, a health screening questionnaire, and demographic questions. We used the same incremental intensity exercise protocol on an electromagnetically braked cycle ergometer as described by Ntoumanis, Healy, Sedikides, Duda, et al. (2014, Study 1), which was developed using extensive pilot work. The trial was performed in hyperbolic mode, where power output is independent of pedal frequency. The main trial comprised 10 stages, each lasting 2 minutes. Participants were informed that we were investigating experiences of, and reactions to, success and failure when striving for a challenging goal, which was to complete all stages of the trial. To complete a stage successfully and move on to the next, participants had to maintain at least 70 revolutions per minute (rpm) for the whole stage. Participants were aware that if their intensity dropped below 70rpm for a period of longer than 5 seconds, the trial would cease; they could voluntarily withdraw at any point. The intensity (resistance) of each stage was based on a percentage of mean power output (to control for

differences in fitness and gender), determined via a 3-minute maximal output test completed prior to the main trial. The intensity increased from one stage to the next; thus, the goal of successful stage completion became increasingly difficult during the trial. The mean power output recorded during the maximal test, and the average power output for each stage of the trial are displayed in Table 2.1. During a rest period before the main trial, participants completed goal-related measures. Following this, they were exposed to the prime.

Participants were randomly assigned to a priming condition (autonomous, controlled, neutral). We presented the prime to participants on a computer screen immediately before the main exercise trial. Participants observed a video of an actor describing her/his upcoming involvement in a study, with matched actor and participant gender. As a cover story, we told the participants that the video was part of an unrelated study investigating exercise and memory, and that they would be asked related questions following the main trial. The actor scripts described a task which involved working towards a goal, but also reflected the different goal motives. The autonomous motives prime portrayed challenge, the gain of personally important information from task engagement, and the feeling that the goal would be difficult but enjoyable. In contrast, the controlled motives prime portrayed perceived pressure and goal striving resulting from feelings of guilt. The neutral prime contained no motivational or goal pursuit content; the actor simply described the task used in an (unpublished) imagery effectiveness study, which constituted the author's masters thesis (Healy, Roberts, & Hardy, 2009).

For manipulation checks, participants rated the extent to which the actor was striving with autonomous ("expected to enjoy the activity they were about to do," "felt the activity in their trial was personally important to them") and controlled ("were going to try and achieve their goal to avoid feeling guilty," "were completing the activity because of a research hour or

payment") motives on a 1 (*not at all*) to 7 (*very much so*) scale. We presented these items as memory questions to support the cover story given to participants. The questions were asked after the main trial to maintain the pretense and effectiveness of the prime, as research has suggested that presenting such items immediately after the prime can invoke suspicion from the participants, and lessen the impact of the prime on the desired outcome behaviour (Strack, Schwarz, Bless, Kubler, & Wanke, 1993). Outcome measures (see below) and a funneled debriefing (Bargh & Chartrand, 2000) were completed after the main trial.

Table 2.1

Mean and SD Power Output in Watts Achieved in the 3-minute Maximal trial and For Each Stage of the Main Trial for the Overall Sample and By Gender

	% of maximum	Overall (84)		Male (41)		Female (43)	
		M	*SD*	*M*	*SD*	*M*	*SD*
Mean power output	-	232.12	65.19	275.22	61.97	191.02	34.62
Stage 1	50	116.32	32.59	137.89	30.98	95.74	17.24
Stage 2	60	139.21	39.09	165.05	37.15	114.57	20.79
Stage 3	70	162.54	45.57	192.66	43.34	133.82	24.19
Stage 4	73	169.43	47.60	200.93	45.27	139.40	25.19
Stage 5	76	176.41	49.59	209.17	47.16	145.18	26.36
Stage 6	80	185.70	52.19	220.21	49.58	152.79	27.73
Stage 7	83	192.67	54.16	228.46	51.48	158.53	28.79
Stage 8	86	199.60	56.05	236.68	53.29	164.24	29.70
Stage 9	90	208.96	58.68	247.73	55.81	171.99	31.17
Stage 10	95	220.53	61.93	261.46	58.90	181.50	32.86

Measures

Positive affect. On arrival and after the main trial, participants rated (1 = *do not feel*, 5 = *feel very strongly*) how they felt "right now" on the Positive Engagement subscale of the Exercise-induced Feeling Inventory (EFI; Gauvin & Rejeski, 1993). This subscale comprises three items: "enthusiastic", "happy", and "upbeat".

Future interest. Following the main trial, three items ("I would be interested in participating in this study again in the future;" "I would recommend this study to my friends;" "I would be interested in participating in other studies like this one in the future") assessed interest in future participation in the same or similar studies (1 = *not at all*, 7 = *very much so*). We generated these items for the purpose of this study.

Control variables. As goal striving is affected by perceived goal difficulty and goal efficacy (Locke & Latham, 2002), participants responded to three goal difficulty (e.g., "how difficult is your goal?") and three goal efficacy (e.g., "how strong is your belief that you are able to achieve your goal?") items (1 =*not at all*, 7 = *very much so*). These items were completed before the prime prior to the main trial.

Persistence. Persistence was operationalised as the total number of stages completed and as the percentage of age-predicted maximum HR achieved at the end of the trial controlling for baseline HR. This was measured at rest prior to the study and at every stage of the main trial. HR increases during exercise can be used as an indicator of central command, which is related to the parallel activation of cardiovascular and motor systems during exercise and the individual's perception of the effort required to perform a task (Williamson, Fadel, & Mitchell, 2006). As such, working at higher HR levels could indicate that the individual is exerting a higher level of effort in order to persist towards their goal. An individual's maximum HR will vary with age and can be predicted by subtracting age from 220: therefore,

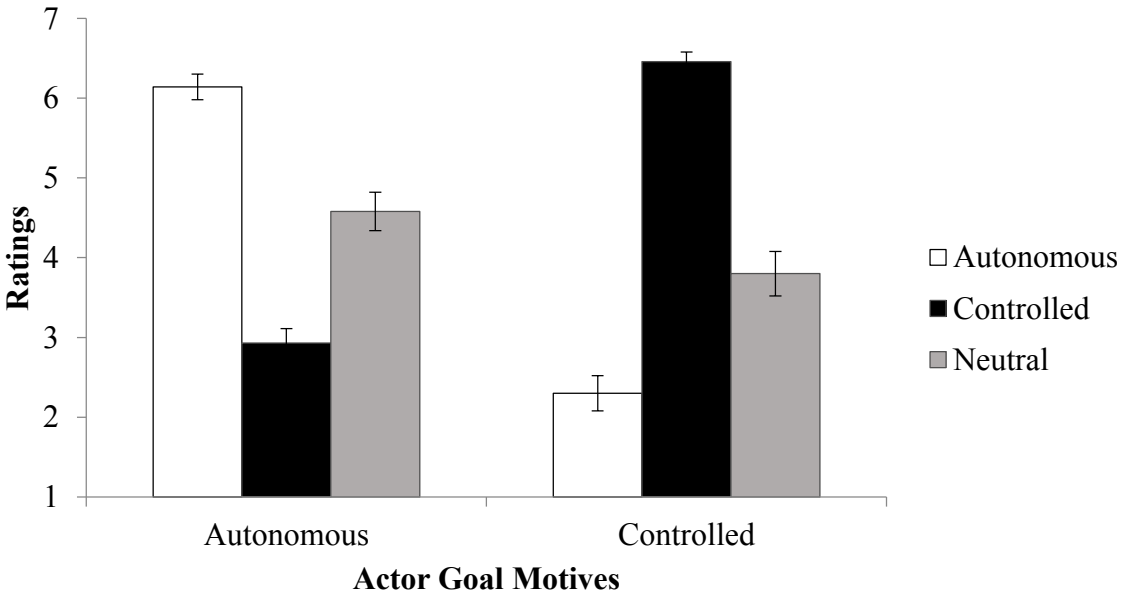
to standardise the variable across all participants, we expressed the HR that a participant reached when they ceased the trial as a percentage of their age-predicted maximum. Participants' resting HR was measured to control for baseline differences, which may have been naturally occurring or due to differences in fitness levels.

Results

Preliminary Analyses

Six participants were removed (one had previous triathlon experience, five indicated suspicion of the prime) from all analyses, leaving data from 84 participants (43 female; *M*age = 19.58 years, *SD*age = 1.12). Three ANOVAs revealed that participants in the three primed groups (27 autonomous, 27 controlled prime, 30 neutral) did not differ in age nor in number of hours spent training or cycling per week, $F(2, 81) < 1.82$, $p > .05$, partial $\eta^2 = .04$. Furthermore, a MANOVA showed that the manipulation was successful: Pillai's $V = .78$, $F(4, 162) = 26.07$, $p < .001$, partial $\eta^2 = .39$ (Figure 2.1). Specifically, participants rated the actor as having stronger autonomous motives in the autonomous prime ($M = 6.15$, $SD = .82$) than in the controlled ($M = 2.93$, $SD = .95$) and neutral primes ($M = 4.58$, $SD = 1.32$), $F(2, 81) = 62.20$, $p < .001$, partial $\eta^2 = .60$. Conversely, participants rated the actor as having stronger controlled goal motivation in the controlled prime ($M = 6.46$, $SD = .65$) than in the autonomous ($M = 2.30$, $SD = 1.16$) and neutral primes ($M = 3.80$, $SD = 1.51$), $F(2, 81) = 86.79$, $p < .001$, partial $\eta^2 = .68$. These findings are displayed in Figure 2.1.

Figure 2.1. Ratings of Actor's Goal Motives Across Priming Conditions. All Means Significantly Different at $p < .001$



Descriptive Statistics, Scale Reliabilities, and Pearson's Correlations

Table 2.2 displays descriptive statistics, scale reliabilities, and Pearson's correlations for all variables. All scales showed a high level of internal reliability (αs >.70). Participants reported higher positive affect when they arrived at the laboratory than after the main trial, probably due to the physical investment of this trial and the associated exertion. As such, we created a residual for this variable to use in the main analysis. Non-orthogonal contrast coding compared the effects of the primes. Of interest was the difference between autonomous versus controlled motivation on persistence, and whether controlled motivation undermined persistence compared to a neutral motivation condition. Thus, the controlled prime was the reference category to create autonomous versus controlled and neutral versus controlled contrasts, which became independent variables in subsequent analyses.

Table 2.2

Descriptive Statistics, Internal Reliabilities, and Pearson's Correlations among Study Variables

	M	*SD*	α	1	2	3	4	5
1. Pre Positive Affect	3.10	.68	.70	-				
2. Autonomous vs. Controlled Contrast	-	-	-	-.02	-			
3. Neutral vs. Controlled Contrast	-	-	-	.04	-.51**	-		
4. Persistence	4.10	1.44	-	-.10	.24*	.07	-	
5. Post Positive Affect	2.75	.79	.70	.25*	.03	.02	.31**	-
6. Future Interest	4.65	1.35	.85	.20	.23*	-.03	.23*	.40**

Note: * $p < .05$, ** $p < .01$

Primed Goal Motives, Persistence, Positive Affect and Future Interest

Structural equation modeling (SEM) tested the hypothesised model using MPlus 6 (Muthén & Muthén, 1998-2011) and specifying a robust maximum likelihood estimation method. Each latent factor had one indicator, representing the mean score for all items reflecting that factor. A single-indicator latent factor model was employed, as these models are particularly suited for a sample size insufficient for a multiple-indicator SEM. In single-indicator models, measurement error can be incorporated in the analyses (as with multiple-indicator models), and thus the parameters of the structural model are not attenuated by measurement error (Hayduk, 1987). According to Hu and Bentler (1999), a model which is a good fit to the data is indicated by a non-significant χ^2 test statistic, comparative fit index (CFI) and non-normed fit index (NNFI) values of at least .95, and root mean square error of approximation (RMSEA) and standardised root mean square residual (SRMR) values of below .06 and .08 respectively. Based on these recommendations, this model showed excellent fit, $\chi^2(4) = 1.35$, $p = .85$, CFI = 1, NNFI = 1.19, RMSEA = .00, SRMR = .02 (Figure 2.2). Both the autonomous versus controlled ($\beta = .38$, $p < .01$) and the neutral versus controlled ($\beta = .27$, $p = .02$) contrasts predicted persistence, although the latter effect was possibly due to suppression (given the correlation between the neutral versus controlled contrast and persistence reported in Table 2.2). Persistence predicted positive affect change ($\beta = .42$, $p < .01$), which consequently led to greater interest in future study participation ($\beta = .47$, $p < .01$). The hypothesised pathway from the autonomous versus controlled contrast to future interest was significant ($\beta = .22$, $p = .02$), but the pathway from persistence to future interest was not significant ($\beta = -.07$, $p = .95$). In line with the recommendations of Preacher and Hayes (2008), bias-corrected bootstrapped 95% confidence intervals (BC-CI) were calculated for the indirect effects. There was an indirect effect of persistence on future interest via positive

affect change (β = .20, *p* = .01, BC-CI = .08 to .36). We found additional indirect effects from the autonomous versus controlled contrast (β = .16, *p* = .01, BC-CI = .09 to .49) and the neutral versus controlled contrast (β = .11, *p* = .06, BC-CI = .04 to .46) on positive affect change through persistence. An exploratory analysis specifying a pathway from the neutral versus controlled contrast to future interest was not significant (β = .10, p = .45), and had minimal impact on the model fit. The model remained unchanged when gender, hours of cycling, hours of training, goal difficulty, and efficacy were included as control variables. We display the final model in Figure 2.2, and the descriptive statistics for each condition for the outcome variables are displayed in Table 2.3.

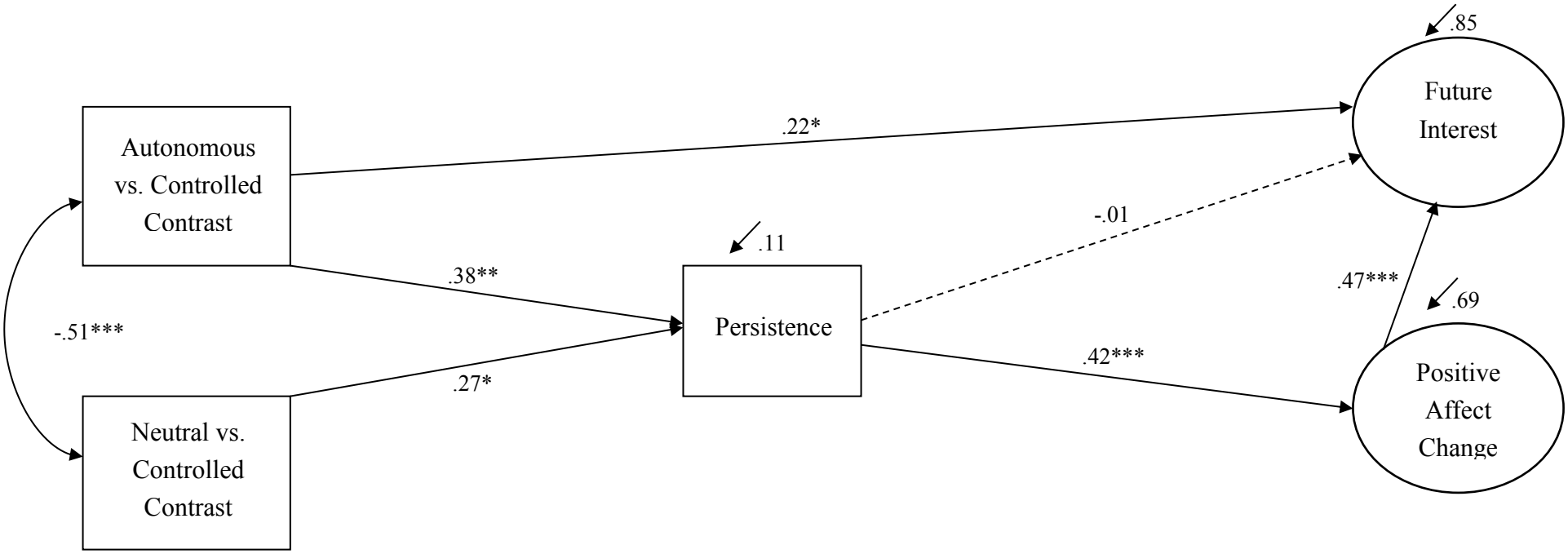
In line with Ntoumanis, Healy, Sedikides, Duda, et al. (Study 1, 2014), we conducted additional multiple regression analyses using HR as the dependent variable. However, when controlling for resting HR, neither the autonomous versus controlled contrast (β = .15, *p* = .25) nor the neutral versus controlled contrast (β = .05, *p* = .69) predicted the final percentage of maximum HR reached by participants.

Table 2.3

Descriptive Statistics and Internal Reliabilities for Positive Affect, Persistence and Future Interest Across the Prime Conditions

	Autonomous Prime			Controlled Prime			Neutral Prime		
	M	*SD*	*α*	*M*	*SD*	*α*	*M*	*SD*	*α*
Pre Positive Affect	3.09	.75	.76	3.07	.68	.71	3.14	.64	.63
Persistence	4.59	1.39	-	3.44	1.34	-	4.23	1.38	-
Post Positive Affect	2.78	.83	.73	2.70	.79	.61	2.76	.76	.75
Future Interest	5.10	1.13	.81	4.27	1.40	.82	4.58	1.40	.87

Figure 2.2. Model Showing the Relationship Between Contrasts of Primed Motives, Persistence, Positive Affect Change and Future Interest.



Note: ⟶ Represents significant pathway ⇢ Represents non-significant pathway

* $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

The findings of the present study show that external motivational cues can influence task engagement when pursuing an increasingly difficult goal. Within the study, we successfully primed different motivational factors using a procedure that is practical yet ecologically sound for sport research. The findings extend previous research (e.g. Ntoumanis, Healy, Sedikides, Duda, et al., 2014, Study 1), by demonstrating that primed autonomous goal motives can impact upon persistence towards an increasingly difficult goal. It seems that the benefits of striving with autonomous motives extend further than behavioural investment to changes in positive affect, consistent with previous goal striving research (Sheldon & Elliot, 1999; Smith et al., 2007; Smith et al., 2011). Moreover, the findings advance past literature by showing that autonomous motives can lead to enhanced interest in future goal engagement. Persistence also leads to greater future interest, albeit indirectly through positive affect change. These findings demonstrate the benefits of striving with autonomous motives, not only for goal pursuit, but also for affective outcomes and future goal engagement, which could encourage continued persistence.

The neutral prime, when compared with the controlled motives prime, resulted in greater persistence. This result is somewhat contradictory to other work (Hodgins et al., 2006), which reported that an impersonal prime produced worse performance than both an autonomous and a controlled prime, however it is possible that this path was due to a suppression effect, as the relationship between these two variables at the bivariate level was non-significant. Also, contrary to previous work (Ntoumanis, Healy, Sedikides, Duda, et al., 2014, Study 1), goal motives did not predict additional measures of persistence (e.g., HR). However, the statistical relations (despite being non-significant in the present study) were in the same direction and were not substantially different in magnitude. It is possible that the

non-significant findings in this study were due to having a dichotomous predictor (i.e., the two prime contrasts) rather than a continuous variable as in previous research.

The use of the prime in this study presents a significant improvement on prior goal striving research. To the best of our knowledge, this was the first example of manipulating motivation for a specific goal, and has been shown to have an effect on persistence and future interest. Furthermore, we used a prime which was not only successful in manipulating goal motivation, but also ecologically valid and easily applicable to a variety of real world settings. This is a clear advantage over other priming techniques (e.g., sentence scrambling, subliminal priming) used in motivation research (Hodgins et al., 2006; Radel, Sarrazin, & Pelletier, 2009), while also possibly providing greater experimental control than the involvement of a confederate (Friedman et al., 2010).

The sport setting that we implemented allowed us to objectively assess persistence and to manipulate goal difficulty in the same manner for all participants. However, the wider processes tested in the study, the measures of affect, and goal interest, the primes that we used, and the empirical findings have broader relevance and offer vital information for other achievement settings, such as business and education. In fact, our results are largely aligned with similar work in other contexts (Koestner et al., 2002) regarding the beneficial role of goal striving with autonomous motives. Given that individuals are faced with increased goal difficultly when pursing important goals in various life domains (Dweck, 2007), our work reinforces calls for developing social environments that facilitate such motives (Smith et al., 2011).

Complementing and extending previous work, the present study supports the central hypothesis that autonomous goal motives will result in greater objectively assessed persistence towards an increasingly difficult goal. The findings showed that increased persistence, as a result of primed autonomous motives, leads to positive outcomes such as

higher positive affect and stronger interest in future task engagement. These findings provide further support for the benefits of autonomous motives for adaptive goal regulation; if individuals strive with more autonomous motives, they will be better equipped to overcome challenges in goal pursuit.

A worthwhile venture for future research would be to explore the interactions between an individual's personal motives and a situational prime, and how these may impact on adaptive goal regulation. In a further effort to link concepts from the self-concordance and self-regulation literatures, future research could also explore the role of goal motives in relation to unfulfilled goals and multiple goal striving. Recent findings have substantiated the negative impact of unfulfilled goals on subsequent performance in other tasks (Masicampo & Baumeister, 2011a; Masicampo & Baumeister, 2011b). It is worth testing whether the motivation for goal striving can moderate such responses to goal failure. Based on the SC model literature, it might be expected that individuals with autonomous (vs. controlled) goal motives will respond with more adaptive behaviour to goal failure and also that their subsequent performance will not be compromised by the preceding failure. There are possibly other indicators of psychological well-being (or ill-being) which could be explored other than affect, for example subjective vitality, depression or burnout. Furthermore, goal motives research has exclusively looked at motives towards a single goal; however, individuals frequently pursue multiple goals concurrently (Louro et al., 2007). Thus it seems pertinent to explore how goal motives impact upon effective goal striving when managing multiple goals, especially when the motivation across goals is incongruent (e.g., autonomous for one goal and controlled for another). In addition, future research could determine factors that help individuals decide whether they should persist in their goal pursuit or strategically disengage from their goal and re-engage in a different goal, given that disengagement, and

not persistence, might be the adaptive self-regulatory response to goal difficulties under certain conditions (Wrosch, Miller, Scheier, & Pontet, 2007).

The findings of our research have implications for those striving in achievement settings, such as sport, business, and education. When individuals are engaging in goal setting, they will benefit from identifying goals that they enjoy or consider personally important. Such motivation can be beneficial, behaviourally and affectively, especially when goals become increasingly difficult over time. Practitioners who aim to facilitate effective goal setting in sport, businesses, and educational settings would benefit from Deci and Ryan's (2000) guidelines for developing autonomous motivation.

To conclude, the present investigation supports and extends previous findings regarding the role of autonomous motivation for adaptive goal striving. Applications of these findings to sport settings could help athletes (and their coaches) be most effective in their goals, especially if supported by the suggested extensions of this research. Regardless of whether motives are personal or primed by others, pursuing goals with autonomous motives sparks greater positive outcomes in terms of behavioural investment (both immediately and through interest in future investment) and psychological well-being.

CHAPTER 3

PREDICTING SUBSEQUENT TASK PERFORMANCE FROM GOAL MOTIVATION AND GOAL FAILURE

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Abstract

Recent research has demonstrated that the cognitive processes associated with goal pursuit can continue to interfere with unrelated tasks when a goal is unfulfilled. Drawing from the self-regulation and goal-striving literatures, the present study explored if the autonomous or controlled motivation underpinning goal striving moderates the responses to goal failure. Athletes (75 male, 59 female, *M*age = 19.90 years, *SD*age = 3.50) completed a cycling trial with the goal of covering a given distance in 8 minutes. Prior to the trial, their motivation was primed using a video. During the trial they were provided with manipulated performance feedback, thus creating conditions of goal success or failure. No differences emerged in the responses to goal failure between the primed motivation or performance feedback conditions. We make recommendations for future research into how individuals can deal with failure in goal striving.

Key words: Goal motivation, goal pursuit, goal failure, executive function, self-concordance, self-determination theory, physical performance

Introduction

Goals form an important function in daily life. A wealth of research has examined how individuals can optimally strive towards their goals in order to experience goal attainment. However, while individuals may hope for success in all of their endeavors, the reality is that they will, at times, not reach the targeted objective and experience failure in their goal pursuits. In this study we explore how the motivation underpinning goal striving might predict an individual's responses to goal success or failure.

Carver and Scheier (2003) suggested that individuals may respond in several ways when they appraise the obstacles experienced in goal pursuit as too difficult to overcome. One option is to give up effort, yet remain committed to the goal. Carver and Scheier proposed that this would lead to feelings of distress and helplessness. Conversely, individuals may disengage from an unattainable goal. Specifically, individuals might choose an alternative path to their goal or form a new goal, both of which might lead to a higher order goal. Alternatively, individuals can scale back their original goal. Both options have the potential for positive behavioural and affective outcomes. Individuals may also disengage from their goal without adopting a new goal. Carver and Scheier suggested that this latter option would result in aimlessness, emptiness and loneliness.

As demonstrated in Carver and Scheier's (2003) framework, goal failure can invoke cognitive, affective, and behavioural responses in individuals. Indeed, there is substantial empirical evidence which demonstrates that goal pursuit can have an impact on cognitive processes. William James (1890) first suggested that goals can occupy cognitive resources. Since his original suggestion, there has been extensive research on cognitive processes that are beneficial for goal striving. For example, Locke and Latham (2002), and Moskowitz (2002) suggested that goals direct attention. When engaged in goal striving, individuals access task-relevant knowledge from memory in order to adopt the most appropriate

approach to goal pursuit (Locke and Latham, 2002). Furthermore, Shah, Friedman, and Kruglanski (2002) demonstrated that conscious processes are important for individuals to shield important goals from other goals, which can facilitate progress in goal pursuit.

It has been suggested that even when an individual fails to achieve a goal, that goal can remain active in working memory for extensive periods of time (Jostmann & Koole, 2009). Additionally, goal failure is often associated with rumination (Martin & Tesser, 1989; Ntoumanis, Healy, Sedikides, Smith et al., 2014), and as previously mentioned individuals might remain cognitively engaged in goal pursuit even if they have ceased working towards it (Carver & Scheier, 2003). Recently, Masicampo and Baumeister (2011a) investigated how the cognitive processes associated with goal striving might have a negative effect by continuing to occupy cognitive resources when goals are unfulfilled. Unfulfilled goals were operationalised as an objective that an individual had been working towards but was yet to be achieved. As such, Masicampo and Baumeister suggested that the presence of unfulfilled goals would impact executive function, which have been defined as "a higher order cognitive ability that controls basic and underlying cognitive function for purposeful, goal-directed behavior" (Etnier & Chang, 2009, p. 470). Executive function is involved in the selection, scheduling and coordination of complex cognitive function, including inhibition, planning and cognitive flexibility (Hillman, Erickson, & Kramer, 2008). In a series of studies, Masicampo and Baumeister induced unfulfilled goal conditions before asking participants to complete a variety of tasks related to two elements of executive function: fluid intelligence (the ability to maintain and manipulate information in working memory) and impulse control (the selective avoidance of certain stimuli and prevention of prepotent responses to such stimuli). In all studies, the presence of an unfulfilled goal (as opposed to no goal or a fulfilled goal) resulted in poorer performance in the executive function tasks. This effect was moderated by an individual's goal tenacity disposition (i.e. the degree to which individuals

generally persist in pursuing goals all the way to completion), whereby those high in goal tenacity were most impacted by unfulfilled goals. Furthermore, when participants had an unfulfilled goal which was later completed, the negative effect on executive function was no longer evident.

The work of Masicampo and Baumeister (2011a) demonstrates that failing to achieve a goal may have consequences that extend beyond this failure. There are, however, some aspects of their work which could be extended. First, in their work, the unfulfilled goal was an aim that was yet to be achieved, in their own words a "frustrated goal". It could be, therefore, that participants felt they could still fulfill the goal at a later time. However, individuals often experience goal failure without the opportunity to continue working on it. For example, an athlete may set a goal to reach the final of their sport at the next Olympics; however due to a false start they fail to qualify from the initial heats. While they may be able to adjust the timescale of their goal (e.g., aim to reach the finals at their next major international competition), the opportunity to achieve their original goal is unavailable. To the best of our knowledge, the impact of unattainable goals on executive function has not been addressed within the literature.

While Masicampo and Baumeister (2011a) showed that an unfulfilled goal only hindered performance on tasks requiring executive function (Study 3), the goal-related as well as the subsequent tasks were mostly cognitive in nature. It is not known whether these results generalise to physical tasks (primary and secondary) which may not be reliant on executive function. Furthermore, research has not explored how failing in a goal which requires physical exertion impacts performance in subsequent tasks requiring executive function. In the current study the primary task required physical exertion; we also had both cognitive and physical follow-up tasks.

One context where goal striving frequently involves physical exertion is sport; an achievement-driven environment where the setting, pursuit and regulation of goals is commonplace (Weinberg, 2013). Given the prevalence and salience of goal pursuit in sport, it seems important to understand how goal failure might impact subsequent physical performance. Anecdotal evidence tells us that some athletes can perceive failure as beneficial for future performance (for example, in a famous advert Michael Jordan describes his performance failures as the reason for his overall and considerable success). Therefore, we manipulated feedback during a physical task to induce goal success or failure, following which we explored the impact of the feedback on performance in several tasks requiring either execution function or physical performance.

A further way in which the extant literature could be advanced is by investigating the role of other individual differences, besides goal tenacity disposition, on the responses to goal failure. One such individual difference from the wider goal striving literature is the underlying motivation with which people strive for their goals. There is growing evidence that demonstrates how diverse types of motivation can differentially impact goal self-regulation (Sheldon & Elliot, 1999; Smith et al., 2007; Ntoumanis, Healy, Sedikides, Duda et al., 2014; Ntoumanis, Healy, Sedikides, Smith et al., 2014). As such, it may be that differences in goal motivation can either accentuate or diminish the impact of failed goals on subsequent tasks requiring executive function.

According to Sheldon and Elliot (1999), and reflecting the motivational regulations outlined in self-determination theory (SDT; Deci & Ryan, 1985, 2000), goal motives can be split into two broad categories. Autonomous motives, reflecting intrinsic and identified regulations, are aligned with an individual's personal values, and reflect the perceived enjoyment, challenge or importance of the goal. Controlled goal motives reflect introjected and extrinsic regulations and are the products of pressure, which may be from external

sources (such as the expectations of important others) or internal factors (for example, feelings of guilt). When striving is underpinned by autonomous motives, individuals have a greater sense of volition, which has been identified as a key determinant of effort in goal striving (Gollwitzer, 1990). As a result, autonomous goal motives have consistently been linked with a range of positive outcomes, including greater persistence in goal pursuit (Ntoumanis, Healy, Sedikides, Duda et al., 2014), higher levels of goal attainment (Sheldon & Elliot, 1999; Smith, Ntoumanis & Duda, 2007; Koestner et al., 2008), and greater psychological and physical well-being (Smith et al., 2007; Smith et al., 2010; Smith et al., 2011; Healy et al., 2014). In contrast, controlled goal motives have generally been found to be unrelated to goal persistence and attainment (Smith et al., 2007; Ntoumanis, Healy, Sedikides, Duda et al., 2014), and to be negatively or unrelated to well-being (Smith et al., 2007; Healy, Ntoumanis, Veldhuijzen van Zanten, & Paine, 2014).

Given these previous findings regarding goal motives and goal-related outcomes, we might expect that goal motives would moderate the impact of failed goals on executive function. Indeed, there may be differences in the responses to goal failure between those striving with autonomous motives, and those who are pursuing goals with controlled motivation. Regarding striving with controlled goal motives, Ntoumanis, Healy, Sedikides, Smith et al. (2014) demonstrated that when a goal becomes unattainable, individuals striving with controlled goal motives do not report adaptive self-regulatory responses. Specifically, in two studies, these authors showed that controlled goal motives were unrelated to both cognitive disengagement and reengagement. Given this finding, we expect that there would be no impact on executive function following goal failure when individuals are striving with controlled motivation.

In contrast, there are several reasons why we expect autonomous goal motives to moderate the responses to goal failure. Masicampo and Baumeister (2011a) showed that

unfulfilled goals have a greater impact on subsequent task performance when individuals reported higher levels of goal tenacity. Given previous findings indicate that those with higher autonomous motives demonstrate greater persistence (Ntoumanis, Healy, Sedikides, Duda et al., 2014), it could be argued that there will be negative consequences when individuals fail to achieve a goal for which they are striving with autonomous motives. This notion is supported by recent research which found that athletes with autonomous goal motives struggled to cognitively disengage from a goal which had become unattainable (Ntoumanis, Healy, Sedikides, Smith et al., 2014). It may be that a similar effect is shown in the responses to goal failure and as such, it could be hypothesised that autonomous goal motives will have a negative impact on executive function resources when individuals experience goal failure.

Equally, however, we could provide an argument as to why autonomous goal motives might be beneficial following goal failure. While Ntoumanis, Healy, Sedikides, Smith et al. (2014) found that those with autonomous motives struggled to disengage from an unattainable goal, they also showed that these individuals found it easier to cognitively reengage in an alternative goal (which led to the same higher order goal), as long as they realised early in their striving that the goal had become unattainable. Furthermore, autonomous goal motives have consistently been associated with greater positive affect (Smith et al., 2007; Ntoumanis, Healy, Sedikides, Duda et al., 2014), which has been shown to play an important role in promoting goal flexibility (Marien, Aarts, & Custers, 2012). Given these findings, we could expect that there would be less of a negative effect on executive function when individuals fail to achieve a goal which is underpinned by autonomous motives.

To summarise, the aim in the present investigation was to examine how goal motivation might moderate (by augmenting or buffering) the impact of goal failure on post-

task executive function and subsequent physical task performance. We expected that there would be no differences in the outcome variables between autonomous and controlled goal motives when the goal was achieved, but a moderation effect would be evident under goal failure conditions. Specifically, we expected a null effect for controlled motives and a significant effect (either positive or negative, as we had equally plausible competing hypotheses) for autonomous motives under conditions of goal failure.

Method

Participants

Following ethical approval from the Science, Technology, Engineering and Mathematics Ethical Review Committee at the University of Birmingham, we recruited 136 athletes (75 male, 59 female, *M*age = 19.90 years, *SD*age = 3.50) from various sports (except cycling and triathlon to avoid inclusion of participants with experience in cycling events) in return for course credit or financial reward (£5). These athletes were from a variety of team (e.g. netball, hockey, rugby) and individual (e.g. athletics, boxing, swimming) sports, and trained on average for 5.98 hours every week (*SD* = 4.07). All participants were aged 18 or over, and were informed they could withdraw from the study without being required to provide a reason for their withdrawal. Written informed consent was gained from all participants prior to participation. Participants were randomly assigned to one of four experimental conditions: autonomous prime success feedback (AS; *n* = 36), autonomous prime failure feedback (AF; *n* = 33), controlled prime success feedback (CS; *n* = 32) and controlled prime failure feedback (CF; *n* = 35). An a priori power analysis conducted using GPower 3.1 (Faul, Erdfelder, Landg, & Buchner, 2007) based on an effect size of f = .15 indicated that a sample of 128 participants was needed for α= 0.05 and power =.80.

Design

We used a 2 (outcome condition: success/failure) by 2 (prime condition: autonomous/controlled) between-subjects design. Our primary goal task involved an 8-minute trial during which participants had to cover an individually-assigned distance goal on a cycle ergometer. We were primarily interested in the impact of our experimental conditions on secondary task performance. As such, we used three secondary tasks, which participants performed in a randomly-assigned order following the cycling trial. Of these three tasks, two measured executive function (Trail Making Test and Anti-Saccade Test) and one assessed physical performance.

Measures

Secondary task performance

Trail Making Test: The Trail Making Test (TMT) measures cognitive abilities such as visual scanning with a motor component, cognitive flexibility and task-set inhibition ability (Etnier & Chang, 2009). TMT consisted of two parts. In part A, participants were required to sequentially link 25 encircled numbers (e.g. 1, 2, 3, 4, etc) on a sheet of paper as quickly as possible. Part B followed a similar format; however, the sequence included alternating numbers and letters (e.g. 1, A, 2, B, 3, C, etc). Participants were given a shorter version of both parts in order to familiarise themselves with the task prior to performing the actual test. For each participant, the time to complete the TMT was recorded on a stopwatch by an experimenter. Participants were required to correctly complete the TMT; if there were any mistakes then the time continued while they returned to make corrections before fully completing the task. For the purpose of the analyses, the time to complete Part A was subtracted from the time to complete part B to a single dependent variable (TAB cost), as this can isolate the executive function from other lower cognitive abilities (Etnier & Chang, 2009).

Anti-Saccade Test: The Anti-Saccade Test (AST) assesses working memory (Kane, Bleckley, Conway, & Engle, 2001). Participants performed the AST, which was designed according to descriptions in previous research (e.g., Everling & Fischer, 1998; Kane et al., 2001), on a computer. Participants were asked to correctly identify a letter (*H* or *T*), briefly presented on the screen by pressing the respective key on a standard UK keypad. These letters were presented in peripheral vision for a period of 100ms, preceded by a green circle which appeared for 400ms as an initial preparatory stimulus. The cue and the stimuli were in 20 point font (approximately 6mm height x 5mm width), and were presented at 10.5 degrees of visual angle from the fixation point (+ at the center of the screen). In the first condition, the pro-saccade condition, both the preparatory stimulus and the letter appeared on the same side of the screen. In the anti-saccade condition, the initial stimulus and letter appeared on opposite sides of the screen; thus participants were required to inhibit the response of attending to the initial stimulus in order to correctly identify the letter. The fixation cross ("+") was presented in the center of the screen for 2000ms and each condition contained a total of 48 trials. For the purpose of our analysis we used anti-saccade error (the number of incorrect responses made in the anti-saccade condition) as the dependent variable, given that higher anti-saccade error indicates lower cognitive control (Everling & Fischer, 1998).

Physical performance: The final measure of subsequent performance was a test of physical performance. We wanted a task for which a) participants were likely to be familiar with without being trained or experts in the physical movements, and b) executive function was not a key requirement for successful performance. With this in mind we chose a buzzer task, where participants were required to move a metal wand along a piece of metal wire which had been manipulated to include curves and bends. If the wand touched the wire, an electrical circuit was completed which set off a buzzer sound. Participants were instructed that they had to move the wand from one end of the wire to the other as quickly as possible,

while also trying to make as few mistakes as possible. They were also informed that for every time the buzzer sounded, 5 seconds would be added to their overall time. As such, both speed and accuracy were important for a successful performance of the task. Participants performed this task three times; the time to complete each trial was recorded by the experimenter using a stopwatch. We created a mean of the three trials to use in our analyses.

Control variables: Given that goal striving can be impacted by perceptions of goal difficulty, importance, and efficacy (Locke & Latham, 2002), we asked participants to rate their perceptions of these variables prior to the 8-minute cycling trial. Specifically, they completed three items for goal difficulty (e.g., "How challenging is your goal?"), importance (e.g., "How important is it to you that you achieve your goal?"), and efficacy (e.g., "How confident are you that you will achieve your goal?") on a 1 (*not at all)* to 7 (*very)* scale. During the trial, we asked participants to rate their goal attainment expectancy (e.g. *"To what degree do you believe you are going to achieve your goal?*") on a 1 (*not at all)* to 7 (*very much)* scale. This was used to ensure that the feedback created the expected perceptions of success and failure for the respective conditions.

Motivational Primes

In order to examine the impact of different goal motives on the responses to goal failure, participants were exposed to either an autonomous or controlled motivation video prime. These primes consisted of watching a gender-matched actor describing their motivation for an upcoming task unrelated to our study task, and were used to induce the goal motivation for the necessary condition. The primes were presented on a computer screen and lasted between 2:14 – 2:45 minutes (depending on the gender and the condition). We developed these primes specifically for goal motives research. In the autonomous prime, the actor described striving for an unrelated goal because of the personal importance of the goal, and how the goal would be challenging but enjoyable. Conversely, within the controlled

prime the actor portrayed that they were striving to avoid guilt-related feelings. The primes have been shown to invoke behavioural responses in accordance with Sheldon and Elliot's (1999) theoretical model, whereby individuals exposed to the autonomous prime demonstrated greater goal persistence than those who received the controlled prime (Ntoumanis, Healy, Sedikides, Duda et al., 2014). As a cover story, and consistent with Ntoumanis, Healy, Sedikides, Duda et al. (2014), participants were informed that the primes formed part of a separate, unrelated study exploring the impact of exercise on memory. During the funneled debriefing participants completed items pertaining to the goal motivation of the actor in the prime, to ensure that the primes were perceived in the manner intended. We administered four items (e.g., "*To what extent did the participant in the video suggest that they were going to try and achieve their goal to avoid feeling guilty?*"; *"To what extent did the participant in the video suggest that they expected to enjoy the activity they were about to do?"*) which reflected either controlled or autonomous goal motives. These items were presented as memory questions in order to maintain our cover story, and participants rated them on a 1 (*not at all*) to 7 (*very much so*) scale.

Feedback manipulation

During the main 8-minute cycling trial, we displayed manipulated feedback to participants on a computer screen immediately in front of the cycle ergometer. This was updated every minute to provide the participant with information related to their progress towards their goal, and varied dependent on the experimental condition. Participants in the AS and CS conditions received feedback to suggest that they were making better than expected progress, with the final values showing they had achieved their goal as they had covered a distance greater than their goal (attaining between 108-111% of their original goal). Participants in the AF and CF conditions received feedback to suggest that they were making worse than expected progress with the final values showing they had not achieved their goal

(reaching between 89-92% of their target distance). Every two minutes during the trial, participants rated their perceptions of effort and goal attainment expectancy.

Procedure

The experimental protocol was similar to that used in previous goal motives research (e.g., Ntoumanis, Healy, Sedikides, Duda et al., 2014; Ntoumanis, Healy, Sedikides, Smith et al., 2014). Participants completed one individual experimental session. Prior to their arrival in the laboratory they were asked to avoid strenuous exercise for 24 hours, and food, alcohol, caffeine, and tobacco for three hours. Participants were fitted with a heart rate (HR) monitor on arrival to record resting HR, before completing consent forms, a health screening questionnaire, and demographic questions. As a cover story, participants were informed that they would be completing a battery of tests with specific goals which assessed factors important for sport performance; as such it was considered that a higher order goal was to perform well across all tasks.

Participants first completed a warm up on the cycle ergometer, followed by an incremental submaximal test. This was performed in order to standardise the workload across participants, and control for the impact of exercise intensity on their psychological responses (Ekkekakis, 2003). The submaximal test consisted of four 2-minute stages where the workload increased at every stage. HR was recorded at the end of each stage, and we extrapolated these values against the workload on the bike. This enabled us to determine the workload required for participants to be working at 50% of their age-predicted maximum HR (220 beats per minute minus age). The load on the bike was set at this level for the 2- and 8-minute cycling tasks.

Participants next completed a 2-minute cycling trial, which was used to create a personal goal for the main cycling trial. For this task, they were informed that their goal was to cover as much distance as possible. In a rest period following the 2-minute trial,

participants were informed that the distance they had just covered would be used to calculate their goal for an 8-minute cycling trial. Specifically, the 2-minute distance was multiplied by four and then slightly adjusted so that the 8-minute goal constituted 95% of this multiplicative value. Previous work (Ntoumanis, Healy, Sedikides, Smith et al., 2014) suggests that this procedure is successful in ensuring the participants feel the goal is difficult yet attainable. Once they were aware of their goal, participants were asked to complete measures that assessed variables which we controlled for in subsequent analyses (e.g., perceptions of goal difficulty, efficacy and importance). The 8-minute goal trial then commenced, with the manipulated feedback presented to all participants as previously described.

Following the 8-minute trial the participants were presented with the three subsequent tasks, the order of which was randomised across participants. After they had performed all three tasks, participants completed a funneled debriefing (Bargh & Chartrand, 2000) to probe for suspicion of both the motivation prime and the success or failure feedback presented during the cycling trial. Debriefing was completed via email once data had been collected from all participants.

Data analysis

Factorial analyses of variance (ANOVAs) and multivariate analyses of variance (MANOVAs) were conducted on the demographic and control variables. There were two between-subject factors; outcome condition (success/failure) and prime condition (autonomous/controlled). In order to ensure that the primes and feedback were perceived in the manner expected across the experimental conditions, we performed two manipulation checks. First, we conducted a mixed model ANOVA for the participants' goal attainment expectancy during the trial. Again, the between-subject factors were the prime and outcome conditions, and the within-subject factor was time (2-minute, 4-minute, and 6-minute). Of

particular interest was the change in perceptions of goal attainment over the trial, and how this was predicted by the prime by outcome interactions. For this analysis, the Greenhouse-Geisser epsilon correction was employed if the Maulchly's test indicated that the assumption of sphericity had been violated. Additionally, to ensure the primes had been perceived as we expected, a factorial (prime condition x outcome condition) MANOVA was conducted on participants' responses to the items regarding the actor's goal motivation. Our primary analyses relating to secondary task performance were analysed using factorial ANOVA. For all analyses, the alpha level was set at $p < .05$.

Results

Preliminary Analyses

Six participants who indicated suspicion of either the prime or the success/failure feedback were removed from all analyses. The data were screened for multivariate outliers using Malhalanobis distance; this resulted in the removal of four further participants. Hence, the final sample consisted of 126 participants (AS $n = 34$, AF $n = 31$, CS $n = 32$, CF $n = 29$).

We present the descriptive statistics and scale reliabilities in Table 3.1. We first conducted preliminary tests to ensure that our findings would not be confounded by group differences in demographics or control variables. Separate two (outcome condition: success/failure) by two (prime condition: autonomous/controlled) factorial ANOVAs showed no significant main effects or interactions for any of the demographic or control variables. There were also no significant main effects or interactions on the actual total distance covered by participants (as opposed to the distance displayed by the manipulated feedback). A two (outcome condition: success/failure) by two (prime condition: autonomous/controlled) multivariate analysis of variance (factorial MANOVA revealed no multivariate or univariate main effects or interactions for the goal-related variables (goal difficulty, goal efficacy, goal

importance). Taken together, the non-significant findings of these analyses suggest that our results were not confounded by group differences in demographics or control variables.

Table 3.1

Cronbach's Internal Reliabilities and Descriptive Statistics for Study Variables by Condition

	α	AS M (SD)	AF M (SD)	CS M (SD)	CF M (SD)
Goal Difficulty	.93	5.03 (1.00)	5.42 (.85)	5.23 (1.05)	5.01 (1.07)
Goal Efficacy	.93	4.97 (1.23)	4.65 (1.18)	4.72 (1.03)	4.95 (1.13)
Goal Importance	.88	5.03 (1.04)	5.02 (.88)	4.93 (1.38)	5.28 (1.04)
Actor autonomous goal motives	.77	6.38 (.72)	6.00 (1.31)	2.66 (1.17)	2.86 (1.32)
Actor controlled goal motives	.71	3.28 (1.58)	3.23 (1.47)	6.50 (.94)	6.69 (.47)
TMT Part A	-	26.46 (6.74)	23.72 (6.60)	24.42 (7.73)	24.35 (8.24)
TMT Part B	-	56.08 (37.69)	46.25 (18.22)	48.01 (15.79)	50.18 (18.16)
AST	-	.06 (.04)	.04 (.04)	.05 (.05)	.06 (.04)
Buzzer task	-	69.86 (29.76)	80.33 (32.99)	73.65 (28.84)	70.21 (26.03)

Note. AS = Autonomous Success, AF = Autonomous Failure, CS = Controlled Success, CF = Controlled Failure, TMT = Trail Making Test, AST = Anti-saccade Test

A mixed model ANOVA on participants' perceptions of goal attainment expectancy indicated a significant time by outcome condition interaction. Pairwise comparisons revealed that those in the success conditions reported higher goal attainment expectancy than those in the failure conditions at all time points. There was also an outcome condition main effect whereby those in the success conditions reported higher overall goal attainment expectancy than those in the failure conditions. There were no other significant main effects or interactions.

A MANOVA examining the participants' responses to the items regarding the actor's goal motivation confirmed that the prime had been perceived in the manner we anticipated across the prime conditions. Specifically, there was a significant multivariate main effect for prime condition but no main effect for outcome condition and no interaction Furthermore, there were significant differences in the ratings of the actor's autonomous and controlled goal motivation between the different primes, with those receiving the autonomous prime rating the actor as higher in autonomous and lower in controlled goal motives than those viewing the controlled prime, and vice versa. Importantly, there were no significant univariate effects for the outcome condition and no interaction. As such, we were satisfied that our primes and the manipulations of feedback had been perceived by participants in line with the four experimental conditions we wished to create. The findings of our preliminary analyses and manipulation checks are displayed in Table 3.2.

Table 3.2.

Results of ANOVAs and MANOVAs Conducted as Preliminary Analyses and Manipulation Checks

	df	Pillai's *V*	*F*	*p*	η^2
Age					
Outcome	1, 122	-	1.30	.26	.01
Prime	1, 122	-	.06	.81	<.001
Outcome x Prime	1, 122	-	3.13	.08	.001
Hours of training					
Outcome	1, 122	-	.17	.68	.01
Prime	1, 122	-	.008	.93	<.001
Outcome x Prime	1, 122	-	.01	.91	<.001
Hours of cycling					
Outcome	1, 122	-	2.10	.15	.01
Prime	1, 122	-	.24	.62	.002
Outcome x Prime	1, 122	-	.16	.69	.001
Distance in 2-minute cycling trial					
Outcome	1, 122	-	.01	.83	<.001
Prime	1, 122	-	.01	.91	<.001
Outcome x Prime	1, 122	-	3.01	.09	.02
Distance in 8-minute cycling trial					
Outcome	1, 122	-	.42	.52	.003
Prime	1, 122	-	.07	.80	.001
Outcome x Prime	1, 122	-	2.08	.15	.02
Goal-related variables					
Multivariate effects					
Outcome	3, 120	.01	.43	.73	.01
Prime	3, 120	.01	. 40	.75	.01
Outcome x Prime	3, 120	.03	1.12	.34	.03
Goal difficulty					
Outcome	1, 122	-	.77	.38	.006
Prime	1, 122	-	.61	.44	.005
Outcome x Prime	1, 122	-	2.01	.16	.02

Goal efficacy					
Outcome	1, 122	-	.02	.89	<.001
Prime	1, 122	-	.05	.83	<.001
Outcome x Prime	1, 122	-	1.88	.17	.02
Goal importance					
Outcome	1, 122	-	.17	.68	.001
Prime	1, 122	-	.70	.40	.006
Outcome x Prime	1, 122	-	.87	.35	.007
Goal attainment expectancy					
Outcome	1, 122	-	50.55	<.001	.29
Prime	1, 122	-	.32	.58	.003
Outcome x Time	1.71, 208.85	-	72.28	<.001	.37
Prime x Time	1.71, 208.85	-	.64	.53	.005
Perceptions of actor goal motives					
Multivariate effects					
Outcome	2, 121	.002	.13	.88	.002
Prime	2, 121	.79	225.74	<.001	.79
Outcome x Prime	2, 121	.02	1.33	.27	.02
Autonomous goal motives					
Outcome	1, 122	-	.19	.67	.002
Prime	1, 122	-	283.41	<.001	.70
Outcome x Prime	1, 122	-	2.08	.15	.02
Controlled goal motives					
Outcome	1, 122	-	.10	.76	.001
Prime	1, 122	-	236.10	<.001	.66
Outcome x Prime	1, 122	-	.31	.58	.003

Secondary task performance

For the TMT analysis, we conducted a two (outcome condition: success/failure) by two (prime condition: autonomous/controlled) ANOVA on the TAB cost score. This factorial ANOVA revealed no significant main effects for outcome condition ($F(1, 122) = .33$, $p = .57$, partial $\eta^2 = .003$) or prime condition ($F(1, 122) = .10$, $p = .75$, partial $\eta^2 = .001$), and no interaction ($F(1, 122) = 1.20$, $p = .28$, partial $\eta^2 = .01$). These findings are displayed in Figure 3.1. A two (outcome condition: success/failure) by two (prime condition:

autonomous/controlled) factorial ANOVA on the anti-saccade error showed there were also no significant main effects for outcome ($F(1, 122) = .02$, $p = .89$, partial $\eta^2 < .001$) or prime condition ($F(1, 122) = .29$, $p = .59$, partial $\eta^2 = .002$), and no interaction ($F(1, 122) = 2.81$, $p = .10$, partial $\eta^2 < .02$). A final two (outcome condition: success/failure) by two (prime condition: autonomous/controlled) factorial ANOVA on the physical performance task showed no outcome ($F(1, 122) = .45$, $p = .51$, partial $\eta^2 = .004$) or prime condition ($F(1, 122) = .36$, $p = .55$, partial $\eta^2 = .003$) main effects, and no interaction ($F(1, 122) = 1.74$, $p = .19$, partial $\eta^2 = .01$) . The AST and physical performance task findings are displayed in Figures 3.2 and 3.3 respectively.

Figure 3.1. Trail Making Test TAB Cost by Experiment Condition

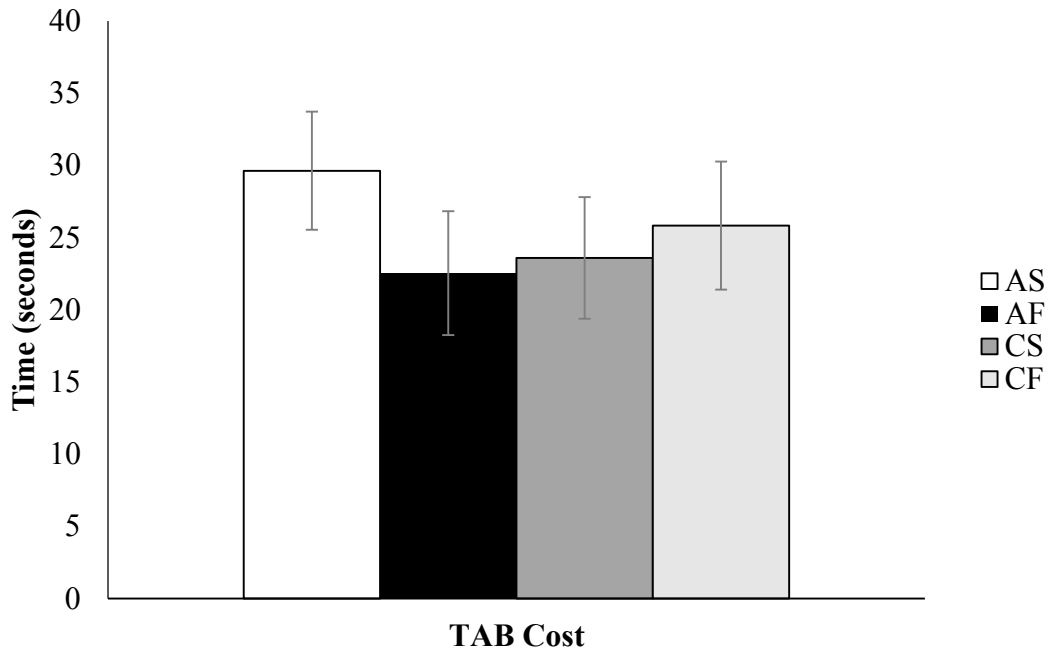


Figure 3.2. Anti-Saccade Error by Experimental Condition

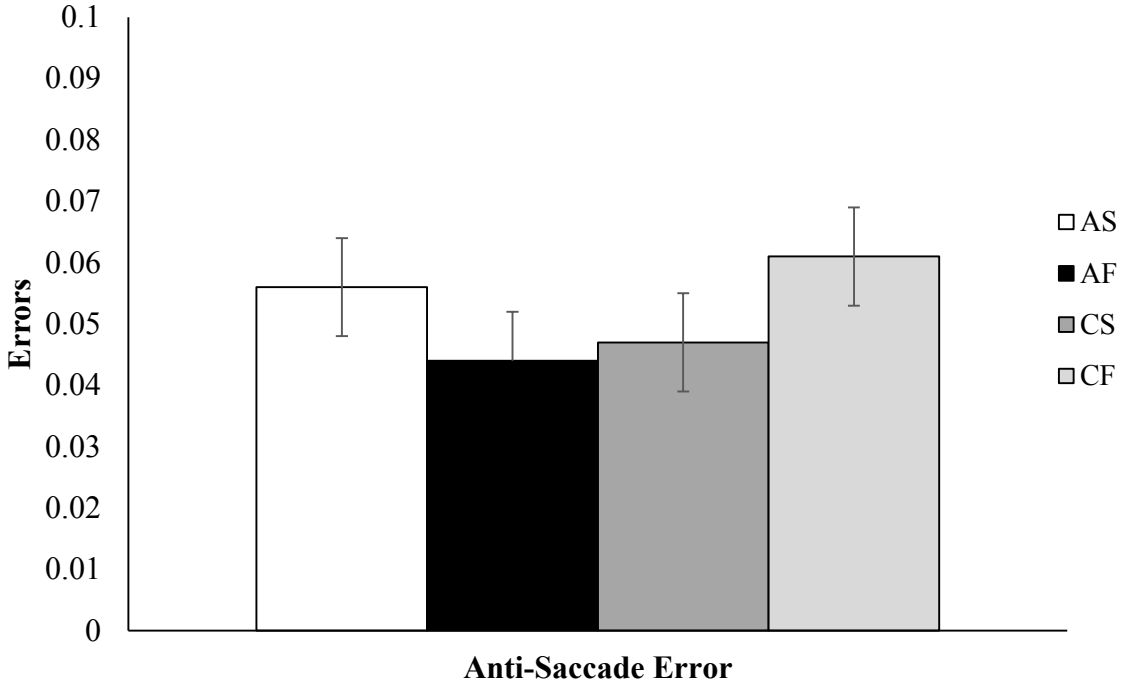
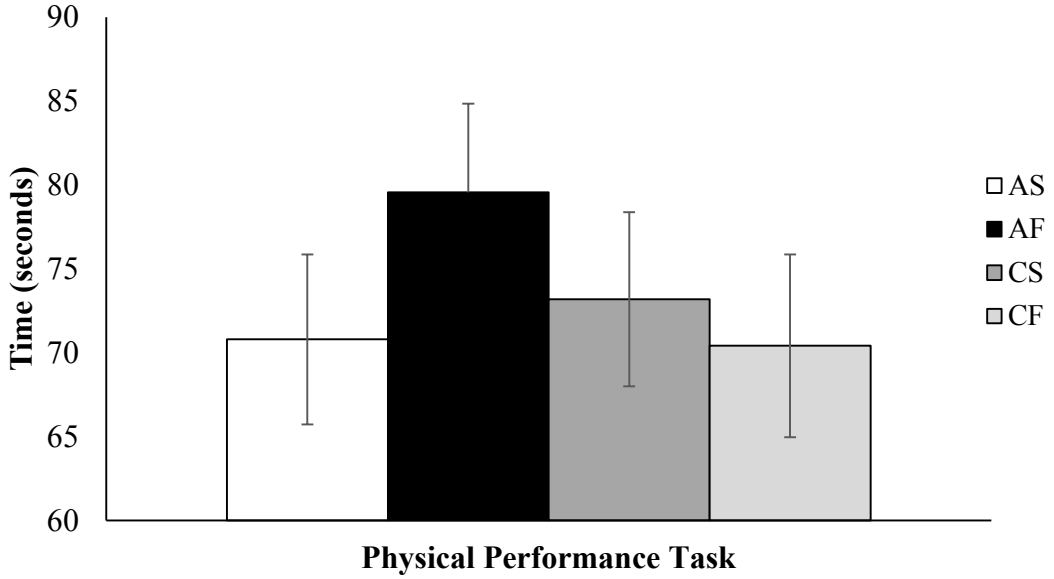


Figure 3.3. Physical Performance Task Time by Experimental Condition



Discussion

This study sought to investigate the moderating effects of goal motivation on the responses to goal failure. Drawing from the self-regulation (e.g. Masicampo & Baumeister, 2011a) and goal striving (e.g. Sheldon & Elliot, 1999) literatures, we hypothesised that under conditions of goal failure there would be an effect of autonomous goal motives on performance in subsequent tasks requiring either executive function or physical movements. Results revealed no support for our hypotheses.

Goal Failure and Executive Function

In view of the findings of Masicampo and Baumeister (2011a) we expected that, regardless of goal motives, those in the goal failure condition would have performed worse in the executive function tasks than those in the goal success condition. We found no support for this. The differences in how we manipulated goal failure might explain why our findings failed to replicate those of Masicampo and Baumeister. These authors used predominately cognitive tasks to induce an unfulfilled goal; that is a goal which has yet to be achieved. In contrast, within our work we used a physical task where participants experienced failure (or success) in their goal pursuit. It is therefore plausible that when goals are failed, as opposed to not yet being achieved, individuals are left without an opportunity to continue in goal pursuit, and the relevant cognitive processes cease to operate with no impact on post-task executive function.

A further explanation for our null finding is the fact that we used a physical task as our initial goal trial. It may be that the acute exercise performed by participants had an impact on their ability to perform the subsequent tasks. A recent meta-analysis which examined the relationship between exercise and cognitive function showed a small but significant improvement in cognitive function following acute exercise (Lambourne & Tomporowski, 2010). While this meta-analysis did not exclusively look at executive function, it may be that

the positive impact of exercise in the present study masks the effect of goal failure on the subsequent executive function tasks. Furthermore, bouts of moderate intensity exercise lasting less than 10 minutes have been shown to have a positive effect on executive function in healthy adults (Chang, Labban, Gapin, & Etnier, 2012). Future studies which wish to explore the impact of unfulfilled or failed goals within a sporting environment may consider using tasks which are not physically exerting or use different exercise durations. For example, goal failure could be manipulated using a discrete skill such as a golf tee shot, and the subsequent impact on related motor skills (e.g., golf putting) and executive function could be tested without the confounding effect of acute exercise.

Goal Motivation, Goal Failure and Subsequent Task Performance

We expected that the effect of goal failure on subsequent task performance would be moderated by the motives underpinning goal striving. Based on previous literature, we expected that those primed with autonomous (as opposed to controlled) goal motives to either have poorer performance (due to higher levels of goal tenacity; Masicampo & Baumeister, 2011a) or greater performance on the subsequent tasks (due to their ability to reengage in alternative goals; Ntoumanis, Healy, Sedikides, Smith et al., 2014) . Our findings offered no support for either hypothesis, as there were no significant differences in subsequent task performance between any of the experimental groups. To the best of our knowledge, the present study was the first to employ goal motivation priming in relation to post-task performance. Previous studies have found a beneficial effect of primed autonomous goal motives in relation to in-task persistence (Ntoumanis, Healy, Sedikides, Duda et al., 2014). Therefore, it is possible that the impact of goal motivation priming following task completion is not as strong as the effect during goal striving. The primes were administered immediately prior to the cycling trial, so it may be that their effect had dissipated by the time of the

subsequent trials. In future research, it may be worthwhile re-priming participants prior to the secondary tasks.

Limitations and Future Research Directions

While the design of the study has several strengths, such as the experimental manipulation of goal motives and goal attainment, and inclusion of both self-report and objective measures, there are also limitations which should be acknowledged. It is possible that the number of tasks involved in the study overloaded the participants. As such, it may be more appropriate for future studies to focus on only one measure of secondary task performance. Further to this, we only manipulated goal motivation for the initial trial. Given that the length of time a priming effect lasts is dependent on the strength of the priming manipulation (Higgins, Bargh, & Lombardi, 1985; Bargh & Chartrand, 2000), it may be that the effect of the manipulated motivation diminished following the cycling trial leading to no effects on the subsequent executive function and physical tasks. Our manipulation checks did show that participants could accurately report the actor's motivation in their respective condition, however it may be that the motivational strength of the primes had diminished when participants were performing the secondary tasks. It may be worthwhile for future research to consider using an additional related prime for the subsequent tasks in order to retain the motivational impact of such methods.

A further limitation of our work is the lack of clear reengagement opportunities. In a study examining motivation and goal disengagement/reengagement by Ntoumanis, Healy, Sedikides, Smith et al. (2014), the secondary task used was a reengagement opportunity which led to the same higher order goal as the initial goal trial. This reflected Carver and Scheier's (2003) suggestion that reengagement in an alternative goal which leads to the same higher order goal as the initial goal can have positive psychological and behavioural

outcomes. Our secondary tasks were not as clearly related to each other as those used by Ntoumanis, Healy, Sedikides, Smith et al. (2014).

Given that this was, to the best of our knowledge, the first study to investigate the cognitive responses to goal failure, it is important that future research continues to explore the impact of failed (as opposed to unfulfilled) goals on executive function. There are several areas which may be explored in future research. The most obvious is to address the aforementioned limitations in the current design. It could also involve using an initial goal task which is less physically exerting. It may also be worthwhile to examine how personal goal motives (independently or in conjunction with primed goal motives) impact on responses to goal failure. Future research could also explore how the failure to achieve goals in one important life domain (such as sport) can impact goal pursuit in another domain (such as education or work). The reality of life is that we are continually working towards multiple goals within and across domains (Louro et al., 2007). As such, it is important that research identifies factors which allow optimal goal striving within and across different contexts, particularly when failure is realised in an important life domain. Finally, if exercise improves executive functioning, and if goal failure harms executive functioning, our null findings might suggest that exercise could be a protective factor for executive functioning against goal failure. However given that this was not the primary aim of the present study it would be worthwhile designing studies specifically to test this suggestion in future research.

Conclusions

To conclude, the present investigation found no support for hypothesised moderating role of goal motivation in the responses to goal failure. Despite this, we feel that our study is potentially important as the psychological literature is dominated by studies with significant findings (Bakker, van Dijk, & Wicherts, 2012). Recent papers (Maner, 2014) have highlighted the importance of publishing null findings, particularly where studies fail to

replicate existing findings, in order to allow for more comprehensive and balanced future meta-analyses. Our study highlights the need for additional experimental investigations into how the motivation underpinning goal striving may (or may not) relate to how individuals react and adapt when they experience failure in pursuit of important goals.

CHAPTER 4

GOAL STRIVING AND WELL-BEING IN SPORT: THE ROLE OF CONTEXTUAL AND PERSONAL MOTIVATION

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Abstract

This investigation sought to clarify mixed results in the literature exploring coach behaviours, basic psychological needs, goal motivation, and well- and ill-being. Regional level team sport athletes (N = 241) completed questionnaires on the aforementioned variables at the beginning of the season. A subsample (n = 70) provided saliva samples to assess physical ill-being. At the end of the season, athletes (n = 98) reported their goal motivation and attainment. Structural equation modeling demonstrated that coach behaviours were related to need satisfaction and thwarting, which were related to autonomous and controlled goal motives respectively. Autonomous motives were related to well- and ill-being; controlled motives were only related to ill-being. Over time, only end-of-season autonomous goal motives were related to goal attainment. The findings provide an insight into how coaches can facilitate optimum goal striving and well-being in their athletes.

Keywords: coaching, motivation, goal striving, basic psychological needs, well-being, ill-being

Introduction

In sport and other achievement-driven contexts, the practice of goal setting to enhance performance is widespread (Weinberg & Butt, 2011). Despite extensive work into effective goal setting (Locke & Latham, 2002), research has only recently explored the role of the motivation underpinning goal striving for goal attainment and psychological well-being. Drawing from Self-Determination Theory (SDT; Deci & Ryan, 2000) and the Self-Concordance (SC) model (Sheldon & Elliot, 1999), the present study explored, using cross-sectional and longitudinal data, links between athletes' perceptions of coach behaviours, athletes' psychological needs and motivation for their goals, as well as their psychological well- and ill-being, and goal attainment over the course of a competitive season.

In proposing the SC model (which is grounded in SDT), Sheldon and Elliot (1999) posited that motivation for goal pursuit can be autonomous or controlled. Autonomous motives reflect enjoyment, interest, or personal value provided by the goal. Conversely, controlled motives are less self-determined and reflect internal (e.g. guilt, anxiety) or external (e.g. the expectations of others) pressures. Sheldon and Elliot suggested that individuals engaging in goal striving with greater autonomous motives invest more effort in goal pursuit and as a result are more likely to attain their goals. A further prediction in line with the SC model is that the interaction between autonomous motives and goal attainment leads to greater satisfaction of three basic psychological needs (autonomy, competence and relatedness), which in turn results in enhanced relative well-being.

Empirical research has generally supported the SC model. In sport, the model was initially tested by Smith et al. (2007), using cross-sectional data. Smith et al. (2011) provided further support for the SC model over the course of a sport season, however, in both studies the interaction between autonomous motives and goal attainment failed to predict need satisfaction. Furthermore, SC model research (Greguras & Diefendorff, 2010; Sheldon &

Schueler, 2011) from other contexts (for example, business, and education) has not supported this interaction. As such, it could be that the satisfaction of the basic psychological needs is not influenced in the same manner as outlined by Sheldon and Elliot (1999), and alternative theoretical models should be considered.

Smith and colleagues (2007; 2010; 2011) extended the original SC model and examined social-contextual antecedents of goal motivation by focusing on coach behaviours. Using a SDT framework, Deci and Ryan (2000) suggested that coach behaviours can be either autonomy-supportive or controlling. When coaches are autonomy-supportive, they offer choices, provide rationale for activities, and acknowledge the perspective of their athletes (Black & Deci, 2000). In contrast, controlling coach behaviours involve coercion and pressure, as well as using extrinsic rewards and negative conditional regard to gain compliance from athletes (Bartholomew et al., 2010). Aligned with the principles of SDT, it has been suggested that autonomy-supportive coaching behaviours lead to more self-determined motivation through psychological need satisfaction (Mageau & Vallerand, 2003; Vallerand, 1997), whereas controlling coach behaviours thwart psychological needs and lead to diminished functioning, ultimately undermining self-determined-motivation (Bartholomew et al., 2011a; Bartholomew et al., 2009).

Smith et al. (2007) found that coach autonomy support predicted autonomous motives and, more strongly, need satisfaction. More recent work by Smith et al. (2011) found that autonomy-supportive coach behaviours were unrelated to goal motives; however, coach autonomy support did predict need satisfaction. A possible explanation for these somewhat contradictory findings could be that need satisfaction mediates the impact of coach behaviours on goal motives, rather than being an outcome of the interaction between goal attainment and autonomous goal strivings. This explanation aligns with Vallerand's (1997) hierarchical model of motivation, with Vallerand suggesting that the social-psychological

environment (for example, coaching behaviours) can predict the extent to which basic needs are satisfied, which in turn predicts the level of self-determined motivation. Greater self-determined motivation would then be expected to lead to more positive cognitive, affective, and behavioural outcomes. Thus, it could be that athletes' goal motives are influenced by the extent to which their needs are satisfied via their interactions with their coach. Therefore, the first aim in the present study was to examine the relations between coach behaviours, need satisfaction, and athletes' goal motives from a hierarchical model of motivation perspective.

Until recently, SDT-based work in sport and other life domains has primarily focused on autonomy-supportive behaviours and the satisfaction of these needs. However, measurement advances have facilitated the exploration of the darker side of athletes' motivational experience in sport. Bartholomew et al. (2010) developed and validated the test scores of a new measure to assess controlling coach behaviours in a sport environment. Further, research has begun to investigate the thwarting of the basic psychological needs (Bartholomew et al., 2011a; Bartholomew, Ntoumanis, Ryan, & Thogersen-Ntoumani, 2011b). This work has shown that need thwarting better predicts negative outcomes than the absence of need satisfaction. As such it seems pertinent that both need satisfaction and need thwarting are independently examined in research predicting positive and negative motivation-related outcomes.

When examining controlling coach behaviours within the SC model literature, Smith et al. (2010) found that athletes were more controlled in their goal motivation when they perceived their coach to be more controlling. However, the researchers did not use the aforementioned measure of controlling coaching behaviours (Bartholomew et al., 2010). Furthermore, to the best of our knowledge, the thwarting of psychological needs has not been examined within SC model research. As such, the second aim of the present study was, using Vallerand's (1997) hierarchical model, to examine both aspects of coach behaviours, as well

as both the satisfaction and thwarting of the basic psychological needs, and how these might be related to athletes' goal motivation.

Research in sport has consistently shown the benefits of autonomous goal strivings for goal attainment (Carraro & Gaudreau, 2011; Gaudreau et al., 2012; Ntoumanis, Healy, Sedikides, Duda, et al., 2014; Smith et al., 2007, 2010). This research has also consistently demonstrated that controlled motives are unrelated to goal progress or attainment. These findings are highlighted in two meta-analyses (Gaudreau et al., 2012; Koestner et al., 2008) in which the authors showed that autonomous, but not controlled, goal motives were related to goal progress. However, to the best of our knowledge, research has not yet examined the stability of goal motives, and how distal and proximal goal motives might relate to goal attainment. It is plausible that the motives with which an individual strives for a goal may change over time as these motives are not dispositional in nature. In such cases, it is important to understand whether it is initial goal motivation that an individual has when they begin goal pursuit, or the goal motives that an individual has when they are close to achieving their goal which are more strongly related to successful goal attainment. Within the literature, goal motives are generally measured at the same time point as perceived goal attainment (e.g. Smith et al., 2007), or at an initial time point with goal attainment measured at a later time (e.g. Sheldon & Elliot, 1999; Smith et al., 2011). Sheldon and Houser-Marko (2001) demonstrated that there could be an upward spiral of goal motivation, whereby higher autonomous goal motivation led to higher goal attainment in the first semester of an academic year, which in turn led to higher autonomous motivation for goals in the second semester. However, in that work the goal motivation in the different semesters was for separate goals. Within the context of this study, we wished to examine how distal and proximal goal motivation were related to each other, and to end-of-season goal attainment.

Autonomous goal motives have also been linked with positive psychological outcomes, such as life and work satisfaction (Judge et al., 2005) and well-being (Miquelon & Vallerand, 2006; Smith et al., 2007, 2010, 2011). The majority of research has used relative well-being, whereby ill-being indicators (e.g. negative affect, burnout) are subtracted from well-being indicators (e.g. positive affect, life satisfaction). While this approach is conceptually and methodologically acceptable, it presents difficulties in exploring the individual relations between goal motives and indices of well- and ill-being. For example, do autonomous motives predict all indices of well-being, and controlled motives all indices of ill-being? There are also indicators of well-being which have not yet been explored within SC model research. For instance, subjective vitality has consistently been linked with psychological need satisfaction within sport research (Adie, Duda, & Ntoumanis, 2008; Balaguer et al., 2012; Gagne, Ryan, & Bargmann, 2003; Mack et al., 2011), however little is known about how this indicator might be impacted by goal motivation. Additionally, only one aspect of burnout (emotional and physical exhaustion) was examined by Smith et al. (2007), and this was subsumed within a relative well-being index. Thus in the present investigation, we explored the relations between goal motivation, subjective vitality, and burnout.

Finally, research has generally focused on self-reported psychological indices, and has failed to explore other indicators of well- and ill-being. Miquelon and Vallerand (2006) explored physical symptoms of ill-being (for example, headache, coughing or sore throat) and self-reported health in a model incorporating goal motives, well-being and stress, however they did not examine the direct or indirect effects of goal motives on physical ill-being and health. Work in the wider SDT literature has started to incorporate biological markers of ill-being. For example, Quested et al. (2011) explored salivary cortisol responses (a biological mediator in stress and physical health; Miller, Chen, & Cole, 2009) in dancers when

performing an important solo. The research found that differences in the cortisol responses to the performance were linked to dancers' perceptions of need satisfaction. Specifically, those with low basic need satisfaction had higher cortisol responses, indicating higher levels of physiological deregulation. Further work by Bartholomew et al. (2011a) showed that the thwarting, but not satisfaction, of the basic psychological needs predicted the levels of secretary immunoglobin A (S-IgA), an immunological protein secreted by mucosa in the respiratory and gastrointestinal tracts which protects against the invasion of infection agents. S-IgA can be impacted by both chronic and acute stress. Within the context of this study, we were primarily interested in acute stress, which can lead to an increase in S-IgA (Bosch, Ring, de Geus, Veerman, & Amerongen, 2002). As controlled goal motivation is often underpinned by pressures, it is plausible that this may result in higher levels of acute stress felt prior to a training session and could impact upon S-IgA levels. However, to the best of our knowledge, links between goal motivation and S-IgA concentrations (or other psychobiological markers) have yet to be examined.

Purposes and Hypotheses

In summary, the present investigation had four aims. First, we explored the relations between coach behaviours, athletes' basic psychological needs, and athletes' goal motivation using Vallerand's (1997) hierarchical model of motivation. Second, we incorporated recent research in the wider SDT literature to explore not just coach autonomy support and need satisfaction, but also controlling coach behaviours and need thwarting. Based on Vallerand's model and empirical evidence (e.g., Bartholomew et al., 2011a), we expected that coach autonomy support would positively predict need satisfaction and negatively predict need thwarting. The inverse pattern of relations was hypothesised between controlling coach environments and psychological need satisfaction and thwarting. These latter two variables were expected to be subsequently linked to greater autonomous and controlled motives for

goal pursuit, respectively. The third aim was to examine the effects of goal motives on indicators of psychological and physical well- and ill-being. We expected that autonomous motives would be positively related to an indicator of well-being (subjective vitality), while controlled goal motives would be positively related to ill-being (burnout, physical symptoms, S-IgA concentration). We also expected that there would be some cross-over effects, whereby autonomous and controlled motives may be negatively related to some indices of ill- and well-being, respectively. This hypothesised model is displayed in Figure 4.1. Finally, in line with previous SC model research, we expected that initial autonomous, but not controlled, goal motivation would predict end-of-season goal attainment. However, when incorporating end-of-season goal motivation, we expected that autonomous goal motivation at the end of the season would be more strongly related to goal attainment, compared to initial autonomous goal motivation. Furthermore, we expected that initial and end-of-season goal motivation to show moderate stability over time, whereby individuals with autonomous or controlled motives at the beginning of the season would be likely to report the same type of motivation at the end of the season.

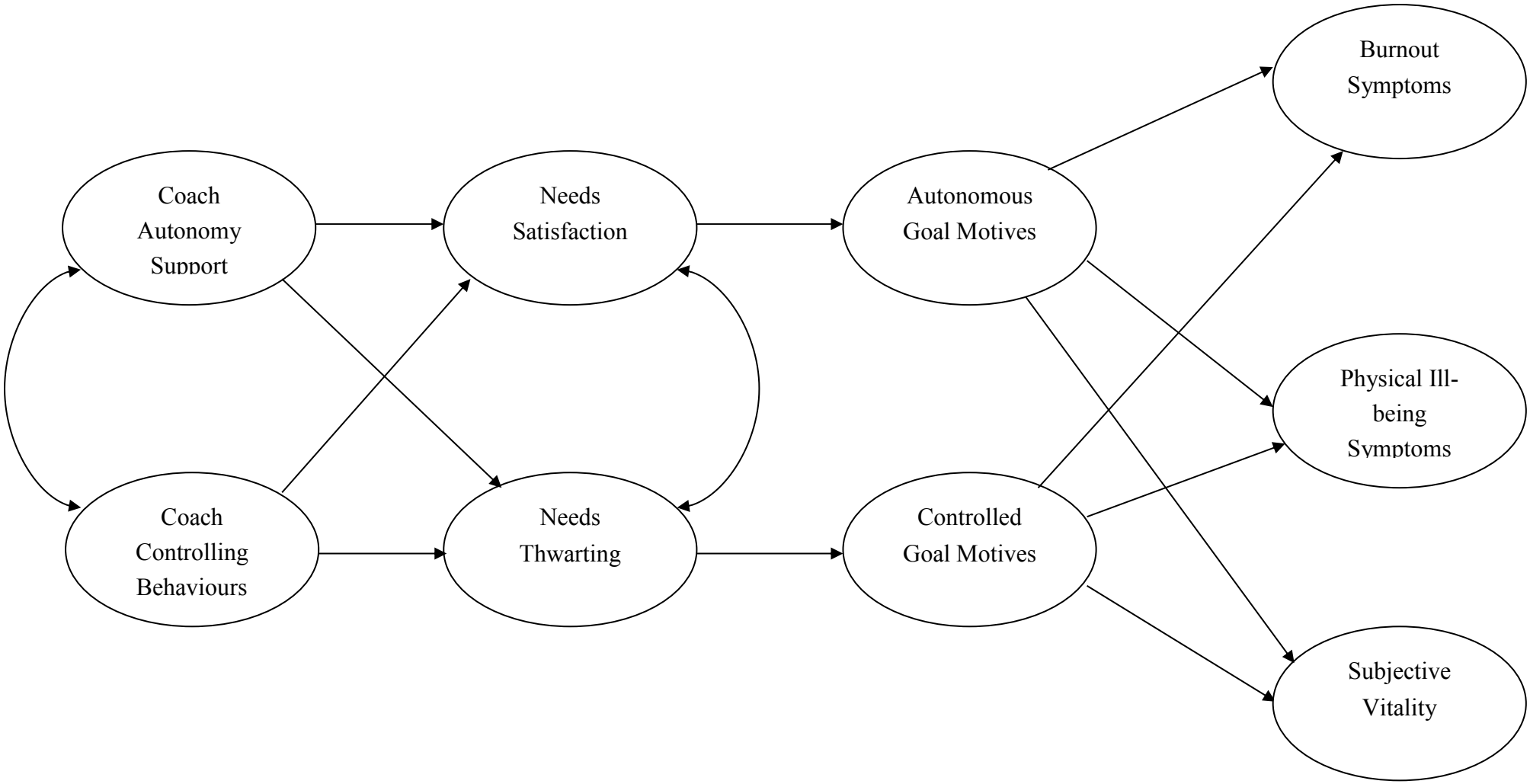

Figure 4.1. Hypothesised model of the expected relations between coach behaviours, basic psychological needs, goal motives and indicators of well- and ill-being.

Method

Participants

Following institutional ethical approval, we recruited 241 athletes (158 male, 83 female; *M*age = 23.06, *SD* = 5.45) from regional level sports teams in the United Kingdom (hockey = 132, rugby = 16, soccer = 48, volleyball = 23, lacrosse = 11, gaelic football = 11). Initial contact with these teams was made through coaches and sport administrators. These athletes had been working with their coach for on average 1.13 years (*SD* = 1.51). Each week, athletes spent 3.26 hours (*SD* = 2.58) training with their coach.

Measures

Perceptions of coach behaviours. Athletes rated their perception of coach autonomy support using adapted items (e.g. "I feel that my coach provides me choices and options") from the Health-care climate questionnaire (Williams, Grow, Freedman, Ryan, & Deci, 1996). They also completed the Controlling Coach Behaviors Scale (Bartholomew et al., 2010) to assess their perception of coach controlling behaviours (e.g. "My coach threatens to punish me to keep me in line during training"). Fifteen items for each scale were rated on 1 *(Strongly disagree)* to 7 *(Strongly agree)* scales.

Basic Psychological Needs Satisfaction and Thwarting. Basic psychological needs satisfaction and thwarting were measured using the Basic Needs Satisfaction in Sport Scale (BNSSS; Ng, Lonsdale, & Hodge, 2011) and the Psychological Need Thwarting Scale (PNTS; Bartholomew et al., 2011b) respectively. The BNSSS contains 20 items (e.g. "In my sport, I feel I am pursuing goals that are my own") and the PNTS has 12 items (e.g. "I feel rejected by those around me"). Both scales were measured on 1 *(Not true at all)* to 7 *(Very true)* scales.

Goal-related variables. Athletes identified their most important personal goal that they would be striving for over the course of the season. In line with previous SC model

research (Sheldon & Elliot, 1999; Smith et al., 2007, 2010, 2011), athletes rated the extent that they were striving with extrinsic ("Because someone else wants you to"), introjected ("Because you would feel ashamed, guilty, or anxious if you didn't"), identified ("Because you personally believe it's an important goal to have") and intrinsic ("Because of the fun and enjoyment the goal provides you") motives. These items were rated on a 1 *(Not at all)* to 7 *(Very much so)* scale. Consistent with other SC model-based research in sport (e.g. Smith et al., 2007), autonomous and controlled goal motives variables were created by aggregating the intrinsic and identified, and introjected and extrinsic items, respectively.

At the end of the season, athletes indicated if they had stopped working towards their goal during the season. Those athletes who responded that they had continued to strive over the duration of the season then reported the extent to which they felt they had attained their goal using a single item on a 1 (*Not at all)* to 7 (*Very much so)* scale.

Given that goal striving can be impacted by perceptions of goal difficulty (Locke & Latham, 2002), athletes rated their perceptions of goal difficulty (e.g. "How hard will it be for you to achieve this goal during the season?"). They also rated how much effort they intended to devote to pursuing their goal (e.g. "How much effort do you intend to devote towards this goal during the current season"). For each variable, participants rated three items on a 1 (*Not at all)/None or not very much)* to 7 *(Very much so/Maximum or very high)* scale. These goal measures were used as control variables.

Well-being and Ill-being. The Subjective Vitality Scale (SVS; Ryan & Frederick, 1997) was completed to assess psychological well-being. Specifically, athletes rated seven items (e.g. "I have energy and spirit") on a 1 *(Not at all true)* to 7 *(Very true)* scale. As a measure of psychological ill-being, athletes completed the Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001). Reflecting the multi-dimensional nature of burnout, participants responded to items on three subscales: Reduced sense of accomplishment (e.g. "I

am not performing up to my ability in my sport"), Devaluation (e.g. I don't care as much about my sport performance as I used to") and Emotional/Physical exhaustion (e.g. "I feel "wiped out" from my sport"). These items were answered on a 1 (*Almost never)* to 5 (*Almost always)* scale. A composite burnout score was created from the three subscales. Physical ill-being symptoms were measured using the Physical Symptoms Checklist (Emmons, 1991). Specifically, the athletes rated, on a 1 *(Not at all)* to 7 *(All the time)* scale, the extent to which they had experienced ten symptoms (e.g. "headache" or "shortness of breath") in the past week.

S-IgA was measured using saliva samples collected prior to a training session using a similar technique described by Bartholomew et al. (2011a). Specifically, athletes were asked to empty any saliva from their mouths, before allowing secretions to accumulate in the floor of their mouths. Every 60 seconds participants spat the accumulations into a pre-weighted polypropylene cup for a total period of 3 minutes. Samples were stored in ice before being homogenized by vigorous shaking on a vortex on return to the laboratory. To eliminate buccal cells and oral micro-organisms, samples were clarified by centrifugations (4000 x g for 10 min at 4˚C). The clear supernatant was divided into 500 µl aliquots and stored at -80˚C until analysis. S-IgA were measured in duplicate using ELISA methods (IgA saliva ELISA, IBL International GMBH, Hamburg, Germany), and was completed in accordance with the manufacturer's instructions. The reported limit of detection of the assays was 0.5 µg/mL. The intra-assay and inter-assay Co-efficient of Variation (CV) percentage was < 10%.

Procedure

The athletes provided written informed consent prior to participating, were aware of their right to withdraw, and received no form of compensation for their participation in the study. Questionnaires were completed either before or after the team's regular training session. Saliva samples were taken from a sub-sample of 70 athletes. As S-IgA concentration

can be affected by exercise (Gleeson, 2000), saliva samples were taken prior to training and participants were asked to avoid eating and drinking 30 minutes prior to samples being collected. At Time 1 (beginning of the competitive season; September-November), athletes identified their most important goal that they were striving for over the course of the season, and completed items for goal motivation, goal difficulty, effort, coach behaviours, basic need satisfaction and thwarting, and well- and ill-being measures. At Time 2 (end of the season; March-April) participants rated their goal motivation and self-assessed goal attainment.

Results

Preliminary Analyses

Of the 241 athletes who completed the initial questionnaire at Time 1, only 98 completed measures at Time 2. Given this attrition rate, the data were analysed in two ways. A cross-sectional analysis was conducted with the whole sample at Time 1, and a separate longitudinal analysis was used for those who had completed all measures. The cross-sectional results are presented first, followed by the longitudinal analysis.

Preliminary analyses were performed to test for differences between those who completed both time points and those who did not. Four multivariate analysis of variance (MANOVA) tests were performed separately for coach behaviours, need satisfaction/thwarting, autonomous and controlled goal motives, and indicators of well- and ill-being. When comparing those who completed questionnaires at both time points and those who completed only Time 1 data, it was found that the former had higher levels of need satisfaction and lower need thwarting (Wilks'Δ = .98, F (2, 238) = 4.06, p = .02, partial η^2 = .03). No other differences emerged. The S-IgA data are presented as total S-IgA concentration (in micrograms per millilitre), and we controlled for S-IgA output (in micrograms per minute, controlling for the effects of salivary flow rate) in line with previous research (Bosch et al., 2001). To calculate the latter variable, the total S-IgA concentration

was multiplied by the salivary flow rate (total amount of saliva collected divided by the number of minutes samples were collected over). Both the total S-IgA concentration and S-IgA output had non-normal distribution therefore the data were log-transformed.

Cross-sectional Descriptive Statistics, Scale Reliabilities, and Pearson's Correlations

The descriptive statistics, scale reliabilities and Pearson's correlations for the cross-sectional data are presented in Table 4.1. The internal reliabilities for autonomous and controlled goal motives were .46 and .51, respectively. While lower than the reliabilities of the other measures used, there were only two items per scale, which may have contributed to the low Cronbach's alpha. Additionally, both the autonomous and controlled goal motives items reflect conceptually related but distinct regulations along the SDT motivation continuum. In our structural equation modeling we used a procedure recommended by Hayduk (1987) to ensure that measurement error did not attenuate the path coefficients (see below for more details).

Table 4.1

Descriptive Statistics, Internal Reliabilities, and Pearson's Correlations among Cross-sectional Variables

	M	*SD*	α	1	2	3	4	5	6	7	8	9	10
1. Coach Autonomy Support	4.81	.84	.86	-									
2. Coach Controlling Behaviours	3.12	.84	.87	-.26**	-								
3. Need Satisfaction	5.32	.68	.89	.51**	-.13*	-							
4. Need Thwarting	2.87	.95	.88	-.44**	.46**	-.54**	-						
5. Autonomous Goal Motives	5.83	.97	.46	.16*	-.09	.36**	-.24**	-					
6. Controlled Goal Motives	2.59	1.37	.51	-.16*	.26**	-.10	.30**	-.11	-				
7. Burnout Symptoms	2.33	.57	.87	-.25**	.18**	-.40**	.53**	-.34**	.30**	-			
8. Physical Ill-being Symptoms	2.35	.98	.81	-.18**	.21**	-.22**	.31**	-.21**	.19**	.32**	-		
9. Subjective Vitality	4.89	.97	.85	.23**	.06	.40**	-.18**	.29**	-.10	-.35**	-.11	-	
10. S-IgA concentration (mg/ml) #	73.62	99.46	-	.11	.19	-.11	.06	-.22	-.13	.17	.06	-.06	-
11. S-IgA output (mg/min) #	38.04	56.75	-	.12	.18	-.10	.06	-.21	-.15	.19	.05	-.13	.89**

Note: * $p < .05$, ** $p < .01$ # n = 70

Coaching Behaviours, Basic Psychological Needs, Goal Motives, and Well- and Ill-Being

The hypothesised model was tested with structural equation modeling (SEM) using MPlus 7.1 (Muthén & Muthén, 1998-2011). A single-indicator approach was employed, whereby each latent factor was represented by the mean score of the respective factor items. Such an approach is suitable when sample size is too small for a multiple-indicator model. The parameters of the structural model are not impacted by measurement error as reliability estimates are incorporated into the model. Using this method, the error variance for each measure was set equal to the variance of the measure multiplied by one minus its reliability. Thus, the path to the measured indicator from the latent variable is equal to the square root of the measure's reliability (Hayduk, 1987).

Hu and Bentler (1999) recommend that a model with a good fit to the data is indicated by a non-significant χ^2 test statistic, CFI and NNFI values which are above .95, an SRMR value which is less than .08 and an RMSEA value lower than .06. The SEM for the hypothesised model showed a poor fit to the data: χ^2 (17) = 38.82, p = .001, CFI = .95, NNFI = .89, SRMR = .05, RMSEA = .07, 90% confidence interval RMSEA = .04 to .10, and the modification indices suggested specifying a direct pathway from need thwarting to burnout. This path was deemed conceptually appropriate, and this addition to the model resulted in an improved fit to the data: χ^2 (16) = 27.63, p = .04, CFI = .97, NNFI = .94, SRMR = .04, RMSEA = .06, 90% confidence interval RMSEA = .02 to .09. Coach autonomy support was positively and negatively related to need satisfaction and need thwarting respectively, with the latter also being positively related to coach controlling behaviours. The hypothesised link between coach controlling behaviours and need satisfaction was non-significant. Autonomous and controlled goal motives were positively related to need satisfaction and thwarting, respectively. Burnout and physical ill-being symptoms were positively related to controlled motives, and negatively related to autonomous motives. Subjectively vitality was positively

related to autonomous motives and unrelated to controlled motives. Based on recommendations by Preacher and Hayes (2008), bias-corrected bootstrapped 95% confidence intervals (BC-CI) were used to test for indirect effects. Coach autonomy support was related to autonomous goal motives through need satisfaction (β = .38, $p < .001$, BC-CI = .20 to .56), and to controlled goal motives through need thwarting (β = -.18, $p < .001$, BC-CI = -.28 to -.09). There was also a significant effect from coach controlling behaviours to controlled goal motives through need thwarting (β = .20, $p < .001$, BC-CI = .09 to .31). Additionally, coach autonomy support was related to burnout through need thwarting directly (β = -.12, $p = .006$, BC-CI = -21 to -.04), need satisfaction and autonomous motives (β = -.13, $p = .001$, BC-CI = -.23 to -.05), and need thwarting and controlled motives (β = -.05, $p = .03$, BC-CI = -.09 to -.003). Coach autonomy support was connected to physical ill-being symptoms through need satisfaction and autonomous motives (β = -.12, $p = .009$, BC-CI = -.21 to -.03) and need thwarting and controlled motives (β = -.06, $p = .03$, BC-CI = -.13 to -.006). Physical ill-being symptoms were associated with controlling coaching through need thwarting and controlled motives (β = .06, $p = .04$, BC-CI = .002 to .13). Subjective vitality was linked to coach autonomy support through need satisfaction and autonomous goal motives (β = .22, $p < .001$, BC-CI = .11 to .33), but not through need thwarting and controlled goal motives (β = .006, $p = .75$, BC-CI = -.03 to .04). Overall, the model explained 51% of the variance in burnout, 24% in physical ill-being symptoms and 35% of the variance in subjective vitality. The final model is displayed in Figure 4.2.

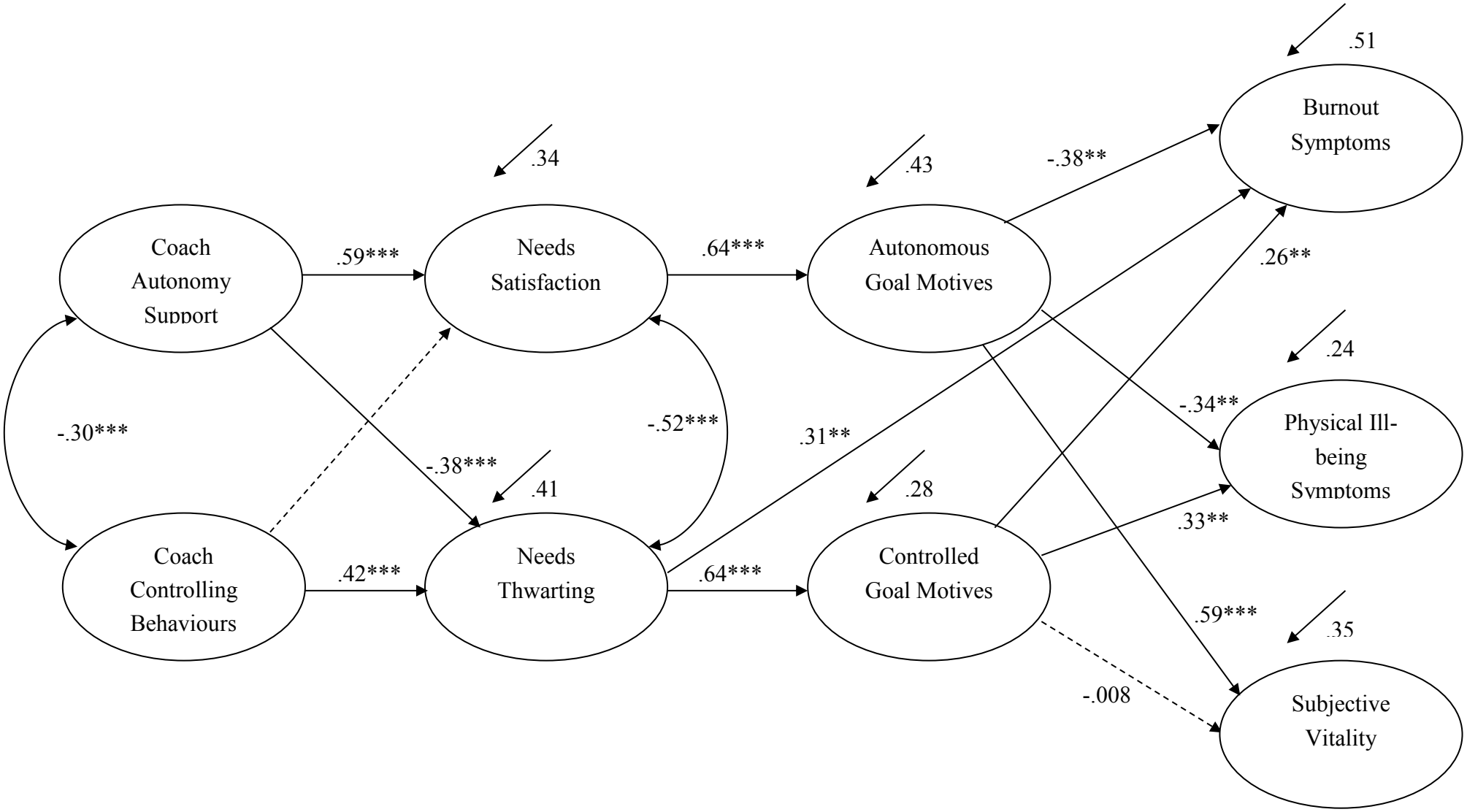

Figure 4.2. Final cross-sectional model showing relations between coach behaviours, basic psychological needs, goal motives and indicators of well- and ill-being (N=241). Direct pathway from need thwarting to burnout symptoms was not hypothesised but was deemed conceptually acceptable. *Note*: ** $p < .01$ *** $p < .001$

We ran a separate SEM also in MPlus for the analysis of the S-IgA variables. Due to the lower sample size a Bayesian approach was employed, as previous research has indicated such methods may produce more accurate results that maximum likelihood estimates with very small sample sizes (Lee & Song, 2004). In this method, posterior predictive checking (PPC; Gelman, Carlin, Stern, & Rubin, 2004) is used to evaluate model fit, whereby an χ^2 test is conducted to compare the model estimates with observed data. A 95% confidence interval is generated for the PPC-χ^2; a model is deemed to be a good fit if this value encompasses 0, or the Posterior Predicted *p*-value is above .50. For each estimated parameter in a Bayesian SEM a 95% credibility interval (CI) is generated. A true relation is likely to exist between variables if this value does not contain 0. A further advantage of using a Bayesian approach is the potential to include prior knowledge into the analysis, whereby the model is tested against a set of known parameters rather than against a null hypothesis (van de Schoot et al., 2014; Zyphur & Oswald, 2013). These can be non-informative (making no assumptions about the direction or strength of relations) or informative (for example, based on values obtained from a maximum likelihood estimate, or from meta-analyses and the available literature). Given that the present study is the first to explore the relation between goal motivation and S-IgA levels, we were unable to use priors based on previous literature. We were therefore presented with the choice of using priors based on a maximum likelihood estimate, or to use no priors in the analysis. Given that it has been suggested that the former option is superior to the latter (van de Schoot et al., 2014), we first ran a maximum likelihood estimate, and used these pathway coefficients as informative priors.

A model was tested which included goal motives and S-IgA concentration, and controlling for S-IgA output. This model had good fit: PPC-χ^2 confidence interval = -11.71 to 12.97, Posterior Predictive *p*-value = .73. Examination of the pathways showed a significant effect between autonomous goal motives and S-IgA concentration (β = -.21, 95 % CI = -.37

to -.02, p = .02). For all the other pathways, the CI encompassed 0 and the p-values were greater than .05. Overall, goal motives significantly explained 7% of the variance in S-IgA concentration. These results are displayed in Figure 4.3.[1]

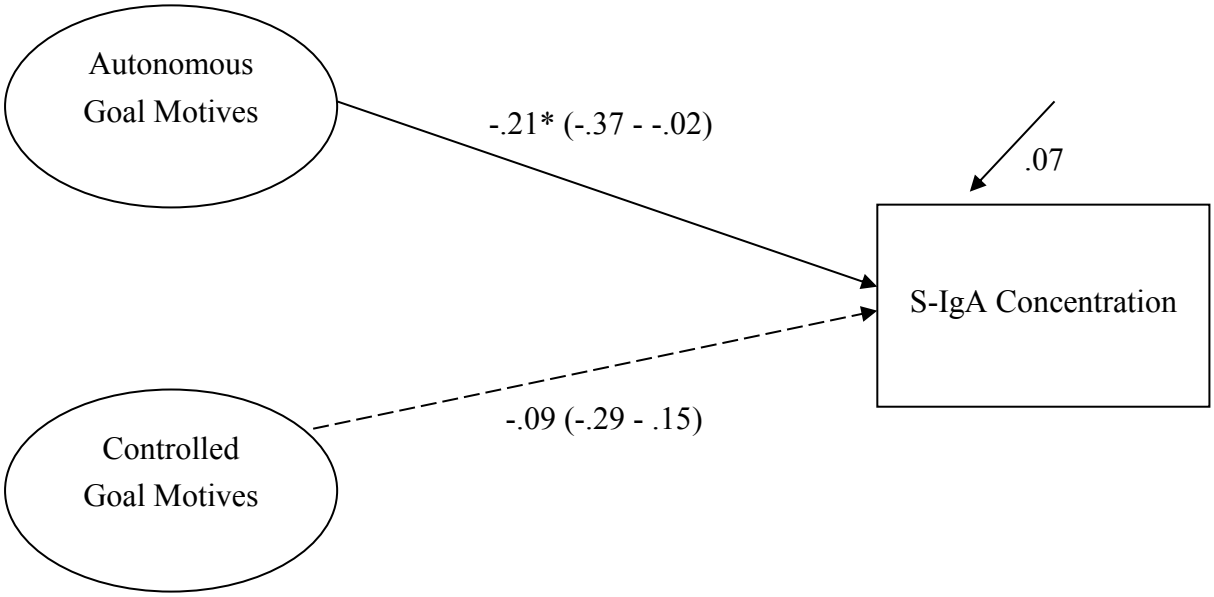

Figure 4.3. Cross-sectional model showing relations between goal motives and S-IgA. Posterior Predictive Checking-χ2 confidence interval = (-11.71, 12.97), Posterior Predictive P-Value = .73.

Note: * $p < .05$

[1] . Based on a comment from an anonymous reviewer, we re-ran the analyses after removing two participants with exceptionally high S-IgA values (potentially indicating the presence of an infection). This resulted in a slight drop in model fit (PPC-χ2 confidence interval = -12.84 to 26.59, Posterior Predictive p-value = .52), although this still represented a good fit. The model estimates remained largely unchanged. Given that we cannot guarantee that these individuals actually had an infection which caused their elevated S-IgA levels, and that the results are largely similar regardless of their exclusion, we did not feel there was a strong enough rationale for not presenting data from the whole sample.

Longitudinal Descriptive Statistics, Scale Reliabilities, and Pearson's Correlations

For the longitudinal data, athletes (n = 12) who reported that they had stopped working towards their goal as it had become unattainable were removed from the main analysis. This resulted in data of 86 athletes. Table 4.2 displays the means, standard deviations, internal reliabilities, and bivariate correlations for the longitudinal data.

Goal Motives and Goal Attainment over Time

Given the rather small sample size, we again used a Bayesian SEM approach when examining the longitudinal data. However, in this model we incorporated informative priors to the model based on previous SC model-based literature. We first tested a model where Time 1 autonomous and controlled goal motives predicted Time 2 goal attainment. This model showed a reasonable fit to the data: PPC-χ^2 confidence interval = -.6.50 to 15.10, Posterior Predictive p-value = .50. As expected, Time 1 autonomous motives significantly and positively predicted Time 2 goal attainment (β = .18, p = .01, 95% CI = .02 to .32), whereas controlled motives were unrelated to goal attainment (β = -.08, p = .21, 95% CI = -.26 to .09). Next, we added Time 2 goal motives into the model, specifying pathways from both Time 1 motives and Time 2 motives to goal attainment. This model demonstrated good fit: PPC-χ^2 confidence interval = -.25.39 to 15.41, Posterior Predictive p-value = .67. In this revised model, the pathway from Time 1 autonomous motives to goal attainment became smaller and non-significant (β = .13, p = .08, 95% CI = -.02 to .28). However, Time 2 autonomous motives were significantly related to goal attainment (β = .17, p = .02, 95% CI = .009 to .32). Controlled goal motivation at both time points was unrelated to goal attainment (Time 1 β = -.04, p = .10, 95% CI = -.25 to .15; Time 2 β = -.02, p = .42, 95% CI = -.23 to .19). There were significant pathways from Time 1 autonomous and controlled goal motives to their respective Time 2 motives (autonomous β = .47, p < .001, 95% CI = .32 to .61; controlled (β = .46, p < .001, 95% CI = .31 to .58), as well as a significant indirect effect from

Time 1 autonomous motives to goal attainment through Time 2 autonomous motives (β = .14, *p* = .02, 95% CI = .01 to .30). These results were unchanged when goal difficulty and goal efficacy were included as control variables. This model explained 10% of the variance in goal attainment, and is depicted in Figure 4.4.

Table 4.2.

Descriptive Statistics, Internal Reliabilities, and Pearson's Correlations among Longitudinal Variables

	M	*SD*	α	1	2	3	4
1. Time 1 Autonomous Goal Motives	5.91	.83	.40	-			
2. Time 1 Controlled Goal Motives	2.50	1.29	.56	-.15	-		
3. Time 2 Autonomous Goal Motives	5.81	.81	.41	.49***	-.10	-	
4. Time 2 Controlled Goal Motives	2.39	1.33	.56	-.15	.47***	-.13	-
5. Time 2 Goal Attainment	4.83	1.45	-	.25*	-.11	.29**	-.08

Note: * $p < .05$, ** $p < .01$ *** $p < .001$

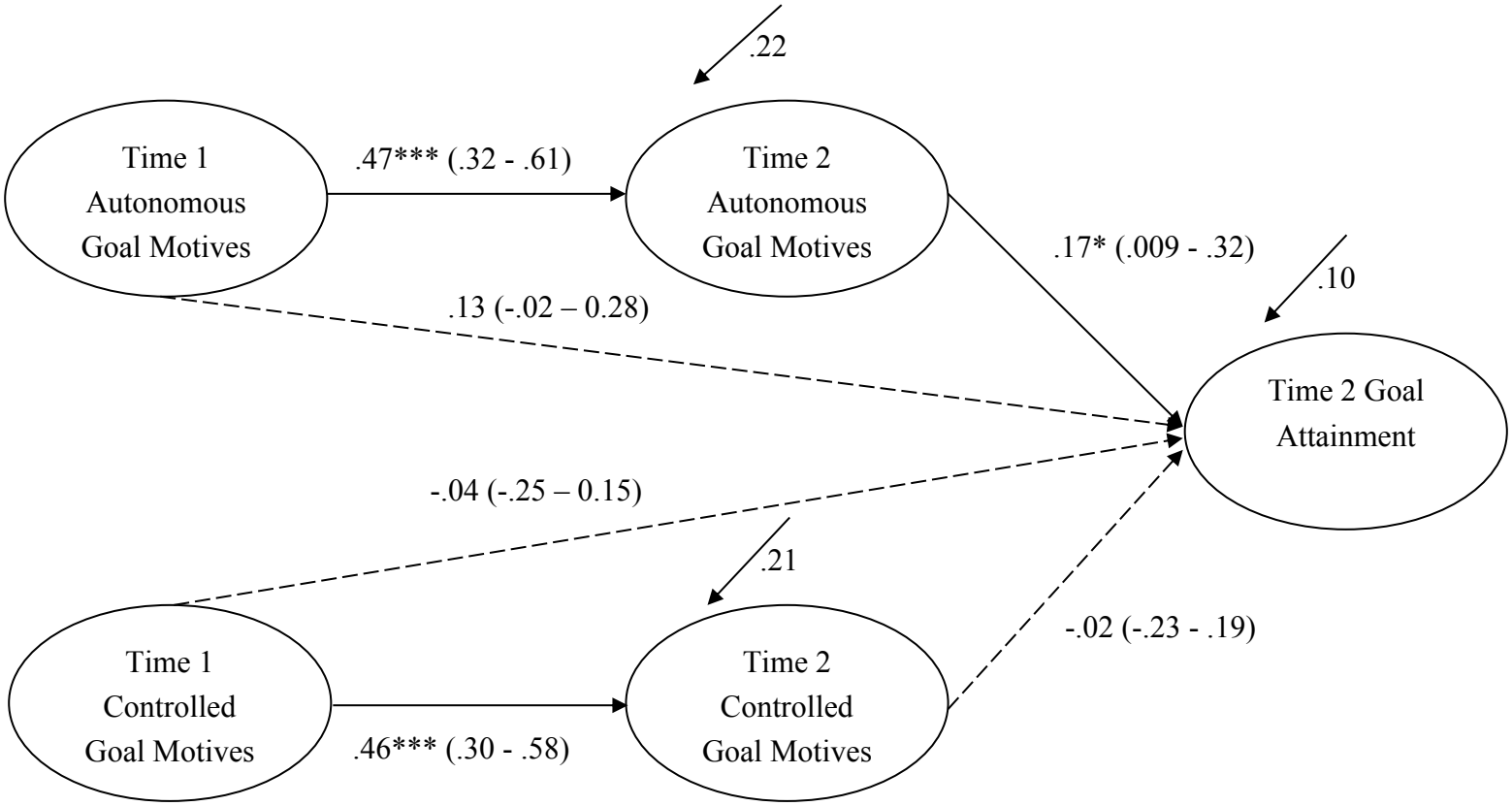

Figure 4.4. Longitudinal model showing relations between Time 1 goal motives, Time 2 goal motives, and goal attainment. For clarity only the final model is displayed. Posterior Predictive Checking-$\chi 2$ confidence interval = (25.39, 15.41), Posterior Predictive P-Value = .67.

Note: * $p < .05$ *** $p < .001$

Discussion

The present study had four aims. Addressing the first and second aims, we explored the relations between coach behaviours, basic psychological needs and goal motives, using the hierarchical model of motivation (Vallerand, 1997). Additionally, we incorporated into our model the independent relations between autonomous and controlled goal motives, and well- and ill-being. Finally, we explored goal motives over the course of a competitive season and how these relate to goal attainment.

Our findings provided a clear picture of how goal motives relate to coach behaviour, through the satisfaction or thwarting of the basic psychological needs. When athletes perceive their coaches to be more autonomy-supportive, they report greater satisfaction of their basic psychological needs, and consequently strive for their goals with higher autonomous motives. Deci and Ryan (2000) proposed that individuals who are exposed to social environments which support the basic psychological needs are more likely to display intrinsically motivated behaviour. Our findings provide further support to this proposition and are an extension of previous work (Adie et al., 2008; Adie, Duda, & Ntoumanis, 2012; Balaguer et al., 2012; Smith et al., 2007, 2011), showing that the extent to which coaches create an autonomy-supportive environment is also related to autonomous goal strivings via basic need satisfaction.

The present investigation took advantage of recent methodological developments in the SDT literature by incorporating measures of coach controlling behaviours (Bartholomew et al., 2010) and psychological needs thwarting (Bartholomew et al., 2011b). As expected, we found that the relation between controlling coach behaviours and controlled goal motives was mediated by psychological needs thwarting. The pathways linking controlling coaching, need thwarting, and controlling goal motives were larger than those linking autonomy-supportive

coaching to need thwarting and controlled goal motives. This supports research which suggests that the "darker" side of athlete experience can better explain extrinsic motivation (Bartholomew et al., 2011a; Bartholomew et al., 2011b; Bartholomew et al., 2010). As such, it is important that both facets of coach behaviours, as well as both need satisfaction and thwarting are considered in the goal striving literature.

Our findings also provide insight into the independent relations between autonomous and controlled goal motives, and multiple indicators of well- and ill-being. Previously, SC model research had utilised relative well-being measures, where ill-being indices were subtracted from well-being indices (Sheldon & Elliot, 1999; Smith et al., 2007, 2010). By investigating well-being and ill-being independently, the present findings suggest that controlled motives are only related to indicators of ill-being, whereas autonomous motives can be linked with both well- and ill-being. Our findings support Deci and Ryan's (2000) propositions regarding motivation and well-being. When individuals strive with more adaptive autonomous motives, this leads to positive psychological benefits (for example, higher well-being and the absence of ill-being). Conversely, controlled goal motivation may have significant negative consequences, such as no benefits for well-being and higher levels of ill-being. Previous research has found similar relations between the satisfaction or thwarting of the basic psychological needs, and well- and ill-being (Bartholomew et al., 2011a; Bartholomew et al., 2011b; Gunnell, Crocker, Wilson, & Mack, 2013). The amount of variance explained by the model in the well- and ill-being measures was less than other studies (e.g. Smith et al., 2007, 2010), although this is likely to be a result of prior studies utilising relative well-being rather than exploring the independent relations from autonomous and controlled goal motives. Nevertheless, our findings demonstrate the importance of exploring these independent relations to fully understand how goal motives are related to

well- and ill-being. Additionally, our model shows that psychological needs thwarting can predict burnout indirectly via controlled motives as originally hypothesised, as well as directly. This latter finding, although not hypothesised, is broadly in line with previous research (e.g., Balaguer et al., 2012; Bartholomew et al., 2011a) which did not measure goal motivation, but found that need thwarting is positively related to burnout.

A novel aspect of the present investigation was the measurement of aspects of ill-being that have not been examined within goal striving research. The results showed that physical symptoms of ill-being are positively and negatively related to both autonomous and controlled motives respectively. Additionally, autonomous motives were linked to lower levels of S-IgA prior to training, a biological marker of stress. While we expected that controlled (rather than autonomous) motives would be related to S-IgA, this finding might be explained by athletes in this study generally having low controlled motives for their goals. Despite only a small amount of variance in S-IgA being explained by autonomous goal motives, this was still a significant proportion and as such the results indicate that when athletes strive with autonomous motives, biological markers of stress are lower prior to training sessions. This could lead to athletes being less likely to feel physically unwell; a proposition supported by the physical ill-being results.

With regard to our final hypothesis, the longitudinal results show that proximal autonomous goal motivation was a significant predictor of self-reported goal attainment at the end of the season, whereas initial autonomous goal motivation was no longer a significant predictor when end-of-season autonomous motivation was controlled for. As expected from past literature, controlled goal motivation at both time points was unrelated to goal attainment. Our results replicate those of several previous investigations (Ntoumanis, Healy, Sedikides, Duda, et al., 2014; Sheldon & Elliot, 1999; Smith et al., 2007, 2011) and further support the

benefit of striving for goals with autonomous motives. It is worth noting that only a small proportion of the variance in goal attainment was explained by autonomous goal motives, although this was a significant amount. This may suggest that over time it is important to consider other factors pertaining to goal attainment, perhaps combining the cross-sectional and longitudinal aspects of the present study to give a more coherent picture of goal striving. However, given that initial goal motivation predicted end-of-season goal motivation, the findings suggest the importance of not only initiating goal striving with autonomous motives, but also maintaining these more adaptive motives throughout goal pursuit. This has implications for coaches, who may need to consider how they can best facilitate their athletes when engaged in goal pursuit by creating need supportive motivational environments (Ntoumanis & Mallett, 2014).

Limitations, future research directions and practical implications

When interpreting the findings of the present results, it is important to consider the limitations of this investigation. First, it would have been worthwhile if we could have explored the relations examined in the cross-sectional analyses at multiple time points over the course of the competitive season. Additionally, with the exception of the S-IgA analyses, the study relied on self-report measures of the psychological constructs. Given recent developments in observational measures of coach behaviours (for example, Tessier et al., 2013), researchers may wish to adopt a multi-method approach so that athlete perceptions can be investigated alongside observing coaches in action. The comparatively lower internal reliabilities for autonomous and controlled goal motives found at both time points in the present study might also be considered a limitation. Given that these measures only contained one item per motivational regulation, future research might consider using several items for each regulatory type to improve the internal reliabilities of both autonomous and controlled

goal motives. A further limitation is the attrition experienced within the study. The second time point of the present study coincided with severe weather, which registered as the coldest UK spring since 1962. This hampered data collection efforts, as many training sessions were outdoors and therefore were cancelled due to snow-covered and frozen pitches. Furthermore, given that training time was limited due to the poor weather, players may have felt that completing questionnaires would further impact on their schedule. It is plausible that these reasons could account for the attrition experienced in the study. Nevertheless, the only significant difference found was that those who completed both time points reported higher need satisfaction and lower need thwarting. Hence, it seems that participant dropout was not systematic in any substantive way.

A potential limitation is that the present study did not measure other aspects of perceived coaching style. Structure and involvement are also important aspects to consider within the coach-athlete relationship (Deci & Ryan, 2000; Pope & Wilson, 2012), yet in the present study we focused on autonomy support and controlling coach behaviours. Future explorations in this area may wish to incorporate structure and involvement into the model in order to offer a more comprehensive examination of the relations between coach behaviours, basic psychological needs and the motivation for goal striving.

Future research could build on the findings of the present study in various ways. First, this study only looked at one goal which athletes were working towards over the course of the season. However, individuals are often working towards several goals at one time (Louro et al., 2007), either just in sport or across different domains. It would be interesting to know how athlete goal motivation might impact goal progress and attainment in these situations, and how coaches might help facilitate optimal goal striving towards multiple goals. Further, it is important to note that goal persistence is not always the most adaptive goal self-regulation

behaviour. There may be certain situations where disengagement from an unattainable goal, and reengagement in an alternative goal is beneficial, both for performance and health (Wrosch, Scheier, Carver, & Schulz, 2003). Recent research has demonstrated that goal motivation might predict the self-regulatory responses to unattainable goals (Ntoumanis, Healy, Sedikides, Smith, et al., 2014), and therefore future research may wish to investigate how the coach can facilitate disengagement from unattainable goals and reengagement in other worthwhile pursuits. Additionally, future work could look at the satisfaction or thwarting of each need separately (rather than grouping these related constructs as "needs"), given that research (e.g. Wilson & Rogers, 2008) has found different relations between these needs and motivation regulations.

A final area which may be of interest to explore with further research is goal contagion and motivation contagion. It has been established that individuals can "catch" goals from those around them (Aarts et al., 2004), also known as goal contagion. Additionally, learners may adopt the inferred motivation of their teacher (i.e., motivation contagion), impacting their own motivation and how autonomy supportive they are when teaching a peer (Radel, Sarrazin, Legrain, & Wild, 2010). Recent research by Ntoumanis, Healy, Sedikides, Duda et al. (2014) showed goal persistence could be primed with videos depicting someone striving for their goal with either autonomous or controlled goal motives. As such, it may be worthwhile to explore how a coach's motivation for their own personal goals, or the motivation of some of the athletes within a team setting, might transfer to the rest of the athletes.

The results of the present investigation have implications for coaches, athletes, and applied practitioners engaged in goal setting. The findings add to the wealth of evidence showing that more positive coaching behaviours are linked to more adaptive motives for goal

striving, which over time can lead to greater levels of goal attainment. As such, coaches may want to consider how they can be autonomy supportive, particularly when working with their athletes to identify important goals, and throughout the goal striving process. Applied practitioners may also try to establish ways of helping coaches to be more autonomy supportive (for examples, see Ntoumanis & Mallett, 2014). Additionally, while the present study used sport as a setting, the findings may have implications for other goal setting environments, such as education and business.

To conclude, the present study supports and extends the literature by demonstrating that both autonomy supportive and controlling coach behaviours can predict autonomous and controlled goal motives through the satisfaction or thwarting of athletes' basic psychological needs. Such processes have implications for psychological and physical well- and ill-being. Over time, those striving with autonomous motives are more likely to attain their goals. By using these findings and being autonomy-supportive in their delivery, coaches may be able to create optimal conditions for their athletes to reach their goals.

CHAPTER 5

GOAL MOTIVES AND MULTIPLE-GOAL STRIVING IN SPORT AND ACADEMIA: A PERSON-CENTRED INVESTIGATION OF GOAL MOTIVES AND INTER-GOAL RELATIONS

This chapter is under review in the

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Abstract

Objectives: This investigation extended the goal striving literature by examining motives for two goals being pursued simultaneously. Specifically, it examined how student athletes' autonomous and controlled motives for their sporting and academic goals were associated with inter-goal facilitation and interference.

Design: Cross-sectional survey.

Method: Student athletes (n = 204) from universities in the United Kingdom identified their most important sporting and academic goals. They then rated their autonomous and controlled motives for these goals and completed questionnaires assessing inter-goal facilitation and interference.

Results: Using a person-centred approach via latent class analysis, we identified three distinct classes of goal motives. Group difference analyses showed that the classes with higher autonomous motives reported greater facilitation from their academic goal to their sporting goal.

Conclusions: Extending the previous literature, the findings demonstrate the benefits of autonomous motives when simultaneously pursing goals in sport and academia.

Key words: Goals, motivation, inter-goal facilitation, inter-goal interference, latent class analysis, self-determination theory

Introduction

Grounded in Self-Determination Theory (SDT: Deci & Ryan, 2000), a major principle of the Self-Concordance (SC) model (Sheldon & Elliot, 1999) is that goal motivation can be autonomous or controlled. Autonomous goal motivation is underpinned by personal interest, importance or enjoyment in goal pursuit. By contrast, controlled motivation is underpinned by internal or external pressures. Autonomous goal motivation is consistently associated with higher levels of goal attainment and psychological well-being (Koestner et al., 2008; Ntoumanis, Healy, Sedikides, Duda et al., 2014; Smith et al., 2007).

The majority of SC model research has focused on one goal in a single domain, such as education (Vasalampi et al., 2012), workplace (Hon & Chan, 2013), health (Miquelon & Vallerand, 2006), and sport (Healy et al., 2014; Smith et al., 2007; Smith et al., 2011). In reality, individuals are often simultaneously pursuing multiple goals in different contexts (Louro et al., 2007). However the literature has not fully explored the role of goal motivation in such situations. To the best of our knowledge, only one study has explored motivation in multiple-goal pursuit. Gorges, Esdar, and Wild (2014) linked goal self-concordance (autonomous goal motives minus controlled goal motives) to the affective responses associated with multiple goal conflict. To generate feelings of goal conflict, junior scientists were asked to consider an instance where they had recently "felt torn" between two activities in their research and teaching tasks. Participants were also asked to identify a goal associated with each of these activities, and reported their motives for these goals. When goal self-concordance was high (reflective of higher autonomous and lower controlled motives), goal conflict was positively associated with positive affect. Conversely, when goal self-concordance was low, goal conflict was positively associated with negative affect. In line with the major principles of SDT (Deci & Ryan, 2000), Gorges et al. suggested that high goal self-

concordance can protect individuals from negative affect when experiencing goal conflict. They also suggested that when goals are more self-determined, individuals may view goal conflict as challenging rather than frustrating.

Gorges et al's (2014) findings suggest that the motives underpinning concurrent goal pursuits are important, as they can moderate affective responses to goal conflict. However, they only investigated goal conflict in one domain. In addition, the relations between goals were not examined. When pursuing multiple goals, individuals may experience facilitation, as well as conflict (Riediger & Freund, 2004). According to Riediger and Freund (2004), inter-goal facilitation – where the pursuit of one goal increases the chance of success in the other goal - occurs through instrumental relations (progress in one goal resulting in progress towards the other goal) and overlapping goal strategies (actions having positive effects on both goals). Inter-goal interference, whereby pursing one goal reduces the likelihood of attaining another goal, operates through resources constraints (striving for one goal detracts time, effort or resources from another goal) or incompatible goal strategies (strategies for one goal conflict with completing another goal). Facilitation is consistently linked with higher levels of goal pursuit, whereas interference is negatively associated with well-being (Riediger & Freund, 2004). To date, the association between goal motivation and these inter-goal relations (e.g. facilitation and interference) has not been previously examined within the literature. Thus, the major aim of the present study was to extend the extant literature by exploring how goal motivation is linked to inter-goal variables in multiple goal striving.

Aligned with the principles of SDT (Deci & Ryan, 2000), it could be hypothesised that autonomous motives may lead to higher levels of facilitation, and lower interference when pursuing multiple goals. Autonomous motivation is considered to be more adaptive, given that it reflects greater integration with the self. As such, autonomous motivation can lead to a

range of positive outcomes, and buffer negative outcomes. Conversely, controlled motivation is predicted to lead to negative outcomes, with no buffering effect. This has been shown within previous goal motives research. For example, Healy et al. (2014) found autonomous goal motives to be positively related to indicators of psychological well-being, and negatively related to ill-being indictors. Controlled goal motives were positively related to ill-being, and unrelated to well-being. As such, in the present study we expected that autonomous goal motives would be positively related to facilitation (a positive goal-related outcome) and negatively associated with interference (a negative goal-related outcome). We also hypothesised that controlled goal motives are positively associated with interference, and unrelated to facilitation. In the present study, we explored these hypotheses in university student athletes striving for both sporting and academic goals. We chose this population as some student athletes struggle to balance their sporting and academic goals, while others are more successful at managing multiple goal pursuits (Cosh & Tully, 2014). Thus, variations in goal motivation might be associated with differences in student athletes' inter-goal relations.

In the original SC model, Sheldon and Elliott (1999) combined autonomous and controlled goal motives to assess overall goal self-concordance. Research has also examined the two motives separately to explore the unique contribution of autonomous and controlled motives to persistence, goal attainment and well-being (Healy et al., 2014; Ntoumanis, Healy, Sedikides, Duda et al., 2014; Smith et al., 2007). However, to the best of our knowledge, different combinations of autonomous and controlled goal motives have not been examined in the literature. For example, research in the wider SDT literature (e.g. Vansteenkiste, Sierens, Soenens, Luyckx, & Lens, 2009) has showed that individuals can report high levels of both autonomous and controlled general motivation, or low levels of all motivational regulations. However, to the best of our knowledge, the SC model research has not examined if

individuals can strive for their goals with high autonomous and high controlled motives (or other combinations of goal motives). Thus, in this investigation we explored our research question using a person-centred approach, which involves the creation of individual goal motives profiles. This was particularly relevant to the present study, as we could create profiles including the autonomous and controlled goal motives for both the academic and sporting goal.

Person-centred research from the wider SDT literature, looking at motivation in general as opposed to motivation linked to a particular goal, has demonstrated that more optimal motivation profiles (i.e. high autonomous, low controlled motivation) are associated with better outcomes (e.g. performance, effort) than those with less optimal profiles (i.e. low autonomous, high controlled motivation or moderate autonomous, moderate controlled motivation; Ullrich-French & Cox, 2009; Vansteenkiste et al., 2009). Thus, we expected that student athletes with a more adaptive goal motivation profile would report higher facilitation and lower interference between their sporting and academic goals, whereas those with less adaptive goal motivation profiles would report lower facilitation and higher interference.

Method

Ethical approval was given from the Science, Technology, Engineering and Mathematics Ethical Review Committee at the University of Birmingham and the Newman University Ethics Committee. We recruited 204 students (103 male, 101 female, *M*age = 21.00 years, *SD*age = 2.09) from various universities in the United Kingdom (UK), who had been participating in their sport for 7.69 ± 5.29 years. Students were contacted online through sport administrators, academic staff and social media, and in person at a major national student competition.

Students completed a battery of questionnaires either online or on paper. Data collection occurred around 4-6 weeks into each semester of the academic year. We chose this point as we felt that students would have commenced goal striving for both their goals.

Participants identified their most important sporting and academic goal that they would be working towards over the remaining academic year. Participants then rated their autonomous and controlled motivation for each of their goals. Specifically students responded to four items related to their extrinsic ("Because someone else wants you to"), introjected ("Because you would feel ashamed, guilty, or anxious if you didn't"), identified ("Because you personally believe it's an important goal to have") and intrinsic ("Because of the fun and enjoyment the goal provides you") goal motives on a 1 *(not at all)* to 7 *(very much so)* scale.

Participants completed the Inter-goal Relations Questionnaire (Riediger & Freund, 2004) to assess facilitation and interference. The facilitation scale had one item each for instrumental goal relations ("The pursuit of my sporting goal sets the stage for the realization of my academia goal") and overlapping goal attainment strategies ("How often has it happened that you did something in the pursuit of your sporting goal that was simultaneously beneficial for your academic goal?"). The interference scale had four items; three assessed resource constraints (e.g., "How often has it happened that because of the pursuit of your sporting goal, you could not invest as much energy into your sporting goal as you would have liked to?"), while the fourth related to incompatible goal attainment strategies ("How often has it happened that you did something in the pursuit of your academic goal that was incompatible with your sporting goal?"). Participants rated the impact of both goals on the other goal (i.e. the impact of the sporting goal on their academic goal and vice versa) in reference to the last month on a 1 (*Never or rarely)* to 5 *(Very often)* scale. For each goal, mean facilitation and interference scores were created from the respective items.

To create goal motives profiles, latent class analysis (LCA) was performed using the MPlus software (Muthén & Muthén, 1998-2011) with maximum likelihood (ML) estimation. We included in the analysis the four goal motivation regulations for each goal; hence, eight variables were used in total. This approach is somewhat different to previous SC model research (Healy et al., 2014; Ntoumanis, Healy, Sedikides, Duda et al., 2014; Smith et al., 2007), where the extrinsic and introjected, and identified and intrinsic scores have been aggregated to form controlled and autonomous goal motives respectively. However, our approach was based on two reasons. First, the four items represent separate (albeit related) motivation regulations. Additionally, previous research has often found these goal motives aggregates to have poor internal reliability (Healy et al., 2014; Ntoumanis, Healy, Sedikides, Duda et al., 2014). Unlike previous studies, in our analyses we were unable to correct for measurement error. Thus, using the individual goal motives variables in our analyses ensured that our findings would not be impacted by poor internal reliability.

While there is no "gold standard" for determining the optimum number of classes in LCA, it is worthwhile to explore a range of solutions and select the number of classes based on the goodness-of-fit indices, the nature of the classes, and theoretical considerations (Gerber, Jonsdottir, Lindwall, & Ahlborg Jr, 2014; Marsh, Ludtke, Trautwein, & Morin, 2009). It is also possible to test if a more complex model offers a better fit to the data than a more parsimonious solution. We examined the model fit criteria from analyses with one and up to five class solutions to determine the optimal number of classes. The bootstrapped log-likelihood ratio test (BLRT) was primarily used as this is more effective than other fit indices for sample sizes of $n < 200$ (Nylund, Asparouhov, & Muthén, 2007). We also inspected the entropy criterion values; higher values indicate a better model fit (Aldridge & Roesch, 2008). Furthermore, the goal motives means for each class were examined in terms of relevance and

appropriateness to theory. After determining the number of classes, we employed a multivariate analysis of variance (MANOVA) to examine between-class differences in inter-goal interference and facilitation.

Results

The data were screened for multivariate outliers using Mahalanobis distance; as a result, we removed 9 participants. Our final sample consisted of 195 participants. Table 5.1 displays descriptive statistics and scale reliabilities. The internal reliabilities for both facilitation variables were slightly lower than those for the interference variables. This may be explained by the facilitation subscale only containing two items whereas the interference subscale contained four items (Cortina, 1993).

Table 5.1.

Scale Reliabilities and Descriptive Statistics for the Whole Sample and for Each Goal Motives Class Separately.

		Total (N = 195)		Class 1 Moderate AM, Moderate CM (n = 21)	Class 2 High AM, Low CM (n = 95)	Class 3 High AM, High CM (n = 79)
		α	M (SEM)	M (SEM)	M (SEM)	M (SEM)
1.	Sport extrinsic goal motives	-	2.30 (.11)	1.52 (.27)	1.63 (.16)	3.22 (.34)
2.	Sport introjected goal motives	-	2.70 (.13)	3.03 (.52)	1.89 (.18)	3.48 (.30)
3.	Sport identified goal motives	-	5.93 (.09)	4.94 (.49)	5.86 (.15)	6.26 (.14)
4.	Sport intrinsic goal motives	-	6.24 (.07)	6.15 (.21)	6.47 (.10)	6.02 (.16)
5.	Academic extrinsic goal motives	-	3.13 (.13)	3.71 (.54)	2.01 (.20)	4.20 (.31)
6.	Academic introjected goal motives	-	4.43 (.13)	4.20 (.44)	3.37 (.35)	5.64 (.19)
7.	Academic identified goal motives	-	6.53 (.05)	4.97 (.17)	6.66 (.07)	6.79 (.06)
8.	Academic intrinsic goal motives	-	4.53 (.12)	3.13 (.45)	5.05 (.21)	4.34 (.02)
9.	Interference from academic goal to sporting goal	.76	2.80 (.07)	3.04 (.28)	2.75 (.08)	2.78 (.11)
10.	Facilitation from academic goal to sporting goal	.65	2.52 (.07)	1.74 (.16)*	2.63 (.08)	2.59 (.11)
11.	Interference from sporting goal to academic goal	.73	2.70 (.06)	2.63 (.20)	2.67 (.08)	2.71 (.10)
12.	Facilitation from sporting goal to academic goal	.63	2.62 (.07)	2.24 (.21)	2.63 (.10)	2.70 (.10)

Note: * indicates significantly different means $p < .01$

Table 5.2 displays the fit indices for the LCA. Using the BLRT, entropy values and our theoretical considerations, we accepted the 3-class solution. Table 5.1 displays the different levels of goal motives and inter-goal relations across the three classes. Class 1 represented 10.7% of the sample (n =21) who reported high intrinsic and low extrinsic motives for their sporting goal, and moderate levels of all other regulations for both goals. Class 2 contained the largest percentage of the sample (48.7%; n = 95). Individuals in this group reported high intrinsic and identified, and low extrinsic motives for both the academic and sporting goals. Furthermore, they had low introjected sport goal motives, and moderate introjected academic goal motives. Class 3 represented 40.5% (n = 79) of the sample. Individuals reported high intrinsic, and moderate extrinsic and introjected motives for both goals. They also reported moderate levels of identified sport goal motives and intrinsic academic goal motives. Based on our theoretical underpinnings (e.g. Sheldon & Elliot, 1999), Class 2 was deemed the most adaptive, given the relatively high autonomous and low controlled goal motives. Given the relative levels of goal motives reported in the different classes, we labelled Class 1 as "Moderate AM, Moderate CM", Class 2 as "High AM, Low CM" and Class 3 as "High AM, High CM".

Table 5.2.

Fit Indices, Entropy, and Model Comparisons for Estimated Latent Class Analysis Models

Model	BLRT	BIC	SSA-BIC	Entropy	LMR test
One class	-	5559.26	5508.57	1.00	-
Two classes	-2737.44*	5451.31	5343.60	.73	126.30*
Three classes	-2672.96*	5498.77	5343.60	.79	72.37
Four classes	-2672.96*	5498.77	5362.55	.60	72.37*
Five classes	-2604.66	5462.87	5298.15	.87	20.23

Note. BLRT = Boostrapped loglikelihood ratio test; BIC = Bayesian Information Criterion; SSA-BIC = Sample Size Adjusted Bayesian Information Criterion; LMR = Lo-Mendell-Rubin likelihood ratio test.
* $p < .01$

Prior to testing for between-class differences in inter-goal relations, we checked that the analysis would not be confounded by the unequal class sizes. There were no outliers and there was a sufficient dependent variable to cell size ratio, hence, we conducted a MANOVA analysis (Hair, Anderson, Tatham, & Black, 1998). We examined the Box M and Levene's Tests to check the equality of covariances and variances, respectively. These tests were all non-significant (*p*s > .05), with the exception of interference from the academic goal on the sporting goal. To correct for this, we adjusted our alpha level to $p < .025$ for this variable (Tabachnick & Fidell, 2001). As such, we were satisfied that any between-class differences were not confounded by the unequal class sizes.

The MANOVA revealed a significant multivariate effect (Pillai's $V = .09$, F (8, 378) = 2.29, $p = .02$, partial $\eta^2 = .05$). There was also a significant univariate effect for academic to sporting goal facilitation (F (2, 192) = 7.66, $p = .001$, partial $\eta^2 = .07$). The univariate effects were non-significant for academic to sporting goal interference (F (2, 192) = .81, $p = .45$,

partial $\eta^2 = .008$), for sporting to academic goal interference (F (2, 192) = 0.09, $p = .91$, partial $\eta^2 = .001$) and for sporting to academic goal facilitation (F (2, 192) = 1.94, $p = .15$, partial $\eta^2 = .02$).

Bonferroni-corrected pairwise comparisons were used to examine the nature of the significant univariate effect. Individuals in the Moderate AM, Moderate CM class reported less facilitation than those in High AM, Low CM ($p = .001$) and High AM, High CM ($p = .001$) classes, with no significant difference between the latter two classes ($p = 1.00$).

Discussion

Using a person-centred approach, this study explored combinations of motivation regulations for sporting and academic goal strivings. We expected that individuals with more adaptive goal motives profiles (i.e. higher autonomous and lower controlled goal motives) would report higher facilitation and lower interference between their goals than those with less adaptive profiles (i.e. moderate levels of both motives, and profiles with high controlled motives). Our findings provide partial support for our hypothesis.

Our findings suggest that, when simultaneously striving for goals in two domains, individuals with high autonomous motives for their sporting and academic goals experience facilitation between goals. The profile with the lowest autonomous motives for both goals (Moderate AM, Moderate CM) also reported lower levels of facilitation from their academic goal to their sporting goal than the profiles who had higher autonomous motives (i.e. High AM, Low CM and High AM, High CM). These findings are aligned with the wider SDT literature. Using cluster analysis, Vansteenkiste et al. (2009) demonstrated that physical education students with higher levels of autonomous motivation reported the most adaptive experiences, regardless of their controlled motivation levels. Similarly, Ratelle, Senècal,

Vallerand and Provencher (2005) found benefits for a range of learning outcomes for students with high autonomous, low controlled motivation and those with high autonomous and controlled motivation when compared with those with low autonomous, high controlled motivation and low levels of both motivation regulations. Recent research in a sport setting which explored motivation profiles in relation to well-being in that context has suggested that high controlled motivation can lead to adaptive outcomes when coupled with high autonomous motivation (Langan et al., 2015). In the context of our findings, it seems that academic goal striving can facilitate the pursuit of a sporting goal only when autonomous goal motives are high for both goals.

We expected to find different levels of facilitation from the sporting to the academic goal among the goal motivation profiles. Our results found no support for this hypothesis. This may be due to the different priorities placed on academic and sporting goals by student athletes. Previous research has suggested that within this population, sporting pursuits are often prioritised over academic goals (Cosh & Tully, 2014). Additional research examining the non-sporting pursuits of elite Australian athletes found that while 72% of athletes felt that their sporting performance had benefitted from their undertaking education or employment, only 59% of the sample felt that their education or employment had benefitted from their sporting pursuits (Price, Morrison, & Arnold, 2010). Our results extend this literature using a British sample; academic goal striving can have a facilitative effect on sporting goal pursuit only when autonomous motives for both goals are high. Furthermore, the present findings suggest that the reverse effect of facilitation from the sporting goal to the academic goal is not dependent of the motivation underpinning goal strivings.

Contrary to our expectations, our findings suggest that differences in goal motivation profiles are not associated with differential levels of inter-goal interference. It is interesting to

note that individuals in all profiles reported moderate levels of interference between their academic and sporting goals. However, this was not moderated by the motives underpinning their goals. This suggests that, in relation to the pursuit of multiple goals across domains, more adaptive forms of motivation cannot protect individuals from inter-goal interference. This is somewhat contradictory to the tenets of SDT (Deci & Ryan, 2000), as it is proposed that autonomous motivation can lead to positive outcomes (in the present study higher levels of facilitation) and buffer against negative outcomes (such as higher inter-goal interference). It may be that in goal pursuit across multiple domains, high autonomous motivation does not have the same buffering effect as found in previous literature (Healy et al., 2014). This unexpected finding warrants future investigation in order to fully understand the association between motivation and inter-goal relations when pursuing goals in multiple domains.

The present study makes a novel contribution to the literature by examining goal motives in multiple-goal situations. However, a limitation is that the analyses used cross-sectional data collected at a single time point. As such, we were unable to determine if goal motives can predict multiple goal attainment. Given that inter-goal facilitation is positively associated with goal progress, we might infer from our findings that, over time, those with an adaptive goal motive profile would have higher levels of attainment for both goals. However, it is important that future research directly examines the associations between goal motives, inter-goal relations, goal attainment and well-being via a longitudinal design.

Future research may also wish to examine how differences in individuals' goal motives can explain differences in inter-goal relations when striving for multiple goals in a single domain. In an athletic domain, it has been suggested goal setting is more effective when athletes set goals to work towards across different sport-related contexts (e.g. training and competition goals) and over different time scales (e.g. short-, medium- and long-term

goals; Weinberg, 2013). Understanding the role of goal motivation in the self-regulation of such multiple goals within one domain would be highly beneficial to athletes and coaches, and would also represent an extension of the SC model research to date.

Conclusion

To conclude, the present study has provided initial understanding of how the motives underpinning goal striving across the academic and sport domains can impact inter-goal relations in student athletes. The findings extend the literature by showing that adaptive goal motivation is also important in multiple-goal pursuit, particularly in relation to inter-goal facilitation. In order to find balance in pursuits across different settings, it is important for individuals to find enjoyment, value or interest in their goals within each domain.

Practical implications

- Student athletes can vary in both quality and quantity of motivation for their sporting and academic goals
- To experience optimum relations between sporting and academic goals, student athletes should try to find personal importance or enjoyment in their goals
- Striving for different goals as a result of pressure or for the avoidance of unpleasant emotions may not necessarily be detrimental for goal relations, as long as the goals are also enjoyable or interesting for the individual.

CHAPTER 6

GENERAL DISCUSSION

Drawing from the Self-Concordance (SC) model and goal self-regulation literatures, this thesis aimed to address a number of gaps in the extant literature. In particular, we wanted to examine the positive and negative impact of contextual factors on autonomous and controlled goal motives and outcomes such as persistence, well-being and subsequent task performance. Additionally, given that the SC model literature has predominately relied upon self-report measures to examine goal-related outcomes, we built on these limitations by including objective measures of goal persistence and ill-being in our research. Furthermore, we extend the SC model literature by examining goal motives in relation to the pursuit of goals in multiple domains. Based on the previous literature, our central hypothesis was that goal pursuit which was underpinned by autonomous motives would lead to greater goal-related outcomes (e.g. persistence, attainment, inter-goal relations) and well-being than when striving with controlled goal motivation. The broad aims of this thesis lead us to examine four primary objectives:

1. To examine the impact of experimentally primed (as opposed to personal) goal motives on goal persistence and well-being
2. To explore how primed goal motives might interact with perceptions of goal attainment to impact performance in future goal strivings
3. To clarify the relations between social-psychological factors, goal motives, goal attainment, and well- and ill-being
4. To investigate how goal motives are associated with inter-goal relations when simultaneously striving for multiple goals.

We have addressed our aims using a range of methodologies and research designs. For example, the research presented in Chapters 2 and 3 used experimental protocols. In Chapter 4, we investigated the relations between social-psychological variables, goal motives, well-

and ill-being, and goal attainment with a combination of cross-sectional and longitudinal analyses. In the final empirical Chapter, we used a survey design with cross-sectional analyses to explore the simultaneous pursuit of goals in two domains. In general, our findings support the major predictions outlined in the SC model (Sheldon & Elliot, 1999) regarding the consequences of autonomous and controlled motives for goal striving. The final chapter in this thesis will summarise the findings of the empirical chapters, providing links with the extant literature. Additionally, we will present suggestions for future research, acknowledge limitations to the present work and highlight the practical implications for those engaging, or supporting others, in goal pursuit in sport. Indeed, while the research in this thesis predominately used sport as a context, the findings may also be highly relevant for those striving for goals in other settings, such as education, business or health.

Summary of Research Findings

Chapter 2

The research presented within Chapter 2 addressed the first aim of the thesis, and is, to the best of our knowledge, the first work to examine the experimental priming of autonomous and controlled goal motives. In addition, we employed novel methodological techniques in order to use a prime which was more ecologically valid and practically applicable than those used in other motivational priming studies (e.g., Friedman et al., 2010; Hodgins et al., 2006; Radel, Sarrazin, & Pelletier, 2009). As such, this study is important for the literature as it explores how behaviour can be impacted by primed goal motivation.

In Chapter 2, we replicated previous findings of the benefits of autonomous goal motives when striving for an increasingly difficult goal (Ntoumanis, Healy, Sedikides, Duda, et al., 2014, Study 1). It seems that regardless of whether motives are primed or personal, individuals with autonomous (as opposed to controlled) motives will persist for longer

towards their goals. Additionally, we supported and extended existing SC model research to show that the benefits of autonomous goal motives extend further than the original behavioural engagement. Specifically, we demonstrated that priming individuals with autonomous motives has benefits for psychological well-being (in the form of higher positive affect) and interest in future goal striving.

Our findings regarding the priming of goal motives reflect similar studies in the wider SDT and goal self-regulation literatures. It has been acknowledged that the activation and pursuit of goals can occur outside of conscious awareness (Bargh, et al., 2001; Custers, Eitam, & Bargh, 2012). Additionally, knowledge of or exposure to an individual's goal pursuit can result in goal adoption and pursuit (Aarts et al., 2004; Shteynberg & Galinsky, 2011). In the SDT literature, Levesque et al. (2008) demonstrated that motivational processes can occur outside of conscious awareness. Our research extends these findings by demonstrating that the specific motives for goal pursuit can be primed, and that these primed motives lead to goal-related behaviours and outcomes in line with Sheldon and Elliot's (1999) propositions in the SC model. Given that the original SC model did not include contextual aspects of motivation, the findings of Chapter 2 represent an initial understanding of how environmental factors can impact goal striving. As such, our research suggests that when engaged in goal pursuit, individuals should consider their own motivation as well as the goal motives of those around them. This has practical implications for coaches and athletes, as well as other individuals setting goals in achievement settings (such as education and business).

Chapter 3

In Chapter 3, we addressed the second aim of the thesis and extended the research presented in Chapter 2. Specifically, we explored how the interaction between primed goal motives and goal attainment impacts subsequent task performance. This built on work from

the goal self-regulation literature which had demonstrated that unfilled goals could continue to occupy cognitive resources even when an individual had ceased goal striving, resulting in poorer performance on tasks requiring executive functions (Masicampo & Baumeister, 2011a). We extended these findings in three ways. First, we explored the impact of failed, as opposed to unfulfilled goals (that is goals which had not yet been achieved). Second, we examined the role of goal motives in moderating the effect of goal failure on subsequent task performance, as Masicampo and Baumeister (2011a) had suggested that their findings might be impacted by individual differences. Finally, we also looked at the impact of goal motives and goal attainment on subsequent tasks requiring physical performance rather than executive functions. Controlled goal motives have been shown to be unrelated to adaptive self-regulatory responses when striving for a goal that has become unattainable (Ntoumanis, Healy, Sedikides, Smith et al., 2014). As such, in Chapter 3 we expected that there would be no impact of goal failure on subsequent task performance when individuals were presented with a controlled goal motives prime. Conversely, we expected that autonomous goal motives might impact subsequent task performance following goal failure in one of two ways. On one hand, as Masicampo and Baumeister (2011a) found the impact of unfulfilled goals on executive functions was greater in those with higher goal tenacity, we posited that individuals exposed to an autonomous goal prime would display poorer subsequent task performance. This was based on research by Ntoumanis, Healy, Sedikides, Smith et al. (2014) which found that individuals with autonomous motives struggled to cognitively disengage from a goal which had become unattainable. On the other hand, given that individuals with higher personal autonomous motives can reengage in alternative goals when they experience challenges in goal striving (Ntoumanis, Healy, Sedikides, Smith, et al., 2014), it was plausible

that those receiving the autonomous prime would exhibit greater subsequent task performance. Our results showed no support for either of these hypotheses.

There are several explanations for the null findings of the study presented in Chapter 3. It is plausible that the physical exercise performed by participants in the initial goal trial had an impact on executive functions (Lambourne & Tomporowski, 2010), confounding performance in the subsequent tasks. Additionally, our work examined responses to goal failure, whereas previous research has examined unfulfilled (Masicampo & Baumeister, 2011a) or unattainable (Ntoumanis, Healy, Sedikides, Smith, et al., 2014) goals. As such, it may be that experiencing goal failure causes the cognitive processes associated with goal pursuit to cease, resulting in no impact on subsequent task performance. It is also possible that our initial and subsequent tasks were not perceived by participants to be suitably related. As such, is important for future research in this area to address this, as it has been suggested that positive psychological and behavioural outcomes can occur when reengagement in an alternative goal leads to the same higher order goal (Carver & Scheier, 2005).

The work presented in Chapter 3 does not support the findings of the other chapters or the literature regarding the benefits of autonomous goal strivings. However, we feel it is important that this is not interpreted that autonomous motives are not adaptive when individuals face challenges in goal pursuit. Indeed, Ntoumanis, Healy, Sedikides, Smith, et al. (2014) demonstrated that personal autonomous motives could lead to psychological reengagement in an alternative goal when the goal an individual was initially pursuing became unattainable. As such, it is important that future research builds on the outlined limitations of our research and continues to explore impact of personal and primed goal motives on the behavioural and psychological responses to goal failure.

Chapter 4

When originally proposed by Sheldon and Elliot (1999), the SC model did not include contextual factors. Smith and colleagues (2007, 2011) attempted to address this by incorporating athletes' perceptions of autonomy supportive and controlling coach behaviours, however the findings of these two studies were contradictory regarding how coaches can facilitate adaptive goal striving in their athletes. For example, Smith, Ntoumanis and Duda (2007) found that perceptions of autonomy supportive coach behaviours were associated with higher levels of autonomous goal motives. However their later work failed to replicate these findings, with coach autonomy support being related to psychological need satisfaction (Smith et al., 2011). As such, in Chapter 4 we aimed to clarify these mixed findings by blending the SC model with another contemporary model of motivation, namely the hierarchical model of motivation (Vallerand, 1997). Within this model, Vallerand (1997) suggests that the satisfaction of the basic psychological needs can lead to higher levels of self-determined motivation. Furthermore, Vallerand suggested that the psychological needs could be satisfied by the interactions that athletes had with their coaches. Given the somewhat equivocal findings of Smith and colleagues (2007, 2010, 2011), we felt that the relations between coach behaviours, athlete goal motives and well-being could be better explained by combining the SC model with the hierarchical model of motivation. As such, Chapter 4 addressed the third aim of the thesis. We also incorporated recently developed measures within the SDT literature to assess the darker side of the athletic experience (Bartholomew et al., 2011b; Bartholomew et al., 2010).

As elucidated in Chapter 4, our findings provide a significant clarification of how coach behaviours can impact goal motives through the basic psychological needs. When athletes perceive that their coaches use more autonomy supportive behaviours, they report

higher satisfaction of their basic psychological needs and are more likely to strive with autonomous goal motives. This supports previous conceptual (Deci & Ryan, 2000) and empirical (Adie et al., 2012; Balaguer et al., 2012) work which has suggested that need supportive social environments are more likely to facilitate autonomous motivation.

Our research in Chapter 4 also incorporated aspects of the darker side of goal striving, namely controlling coach behaviours and the thwarting of the basic psychological needs. In doing this, we utilised recent methodological developments by incorporating the Coach Controlling Behaviors Scale (Bartholomew et al., 2010) and the Psychological Need Thwarting Scale (Bartholomew et al., 2011b). To the best of our knowledge, our work is the first in the SC model literature to examine these measures in relation to goal motives. We found that when coaches are perceived as using a more controlling interpersonal style, athletes report higher thwarting of their basic psychological needs. Consequently, they are more likely to report controlled motives for their goals. It seems that, and as shown in the wider SDT literature (Bartholomew et al., 2011a), coach controlling behaviours and psychological need thwarting better explain extrinsically motivated goal pursuit. This has important implications for coaches who are trying to support their athletes in their goal strivings.

An additional aim of the research in Chapter 4 was to explore the associations between autonomous and controlled goal motives and indicators of well- and ill-being. We wanted to address two primary limitations of the extant literature. First, while well-being has consistently been examined in relation to goal motivation, research has predominately subtracted ill-being indicators from well-being indicators to create a relative well-being score (Smith, et al., 2007, 2011). By using this approach, it was not possible to examine the unique associations between autonomous and controlled goal motives, and indicators of well- and ill-

being. Second, the SC model research had exclusively examined the relations between goal motives and psychological well- and ill-being. As such, in Chapter 4 we incorporated physical (e.g. physical symptoms of ill-being such as headache or sore throat) and psychobiological (e.g. secretory immunoglobin A) indicators of ill-being.

Our findings provide an interesting and important view of how autonomous and controlled goal motives are independently related to well- and ill-being. Autonomous goal motives were positively and negatively associated to both well- and ill-being indictors respectively. Conversely, controlled goal motives were negatively related to psychological and physical ill-being, but unrelated to psychological well-being and psychobiological ill-being. These findings are supported by the theoretical underpinnings of SDT (Deci & Ryan, 2000) and research examining the links between basic psychological needs satisfaction and thwarting, and well- and ill-being (Bartholomew et al., 2011a; Bartholomew et al., 2011b; Gunnell et al., 2013). When individuals pursue their goals for autonomous reasons, they experience benefits in the form of enhanced well-being and diminished ill-being. Controlled goal motives, on the other hand, do not contribute to well-being and are associated with higher ill-being. The findings are particularly important to the SC model literature, especially considering this was the first study to explore goal motives in association with physical and psychobiological ill-being.

The final aim of the research in Chapter 4 was to examine the stability of goal motives over time, and how distal (e.g. beginning of the competitive season) and proximal (e.g. end of the competitive season) might relate to goal attainment. We demonstrated that goal attainment was positively related to proximal autonomous goal motives, whereas distal autonomous motives were indirectly related to goal attainment through the proximal autonomous motives. Neither distal nor proximal controlled motives were associated with goal attainment. These

findings are broadly in line with our findings in Chapter 2, and also support the extant literature (e.g., Koestner et al., 2008). The results also present an important implication for goal striving, in that it is important to start goal striving with adaptive goal motives, but also maintain these motives over time as individuals make progress towards their goals. It would be worthwhile for future research to explore how personal and contextual factors can contribute to the maintenance of autonomous motives, and longitudinally examine how this might be associated with benefits for goal attainment and well-being.

Chapter 5

Chapter 5 addressed the final aim of the thesis, and explored the associations between goal motivation and inter-goal relations when simultaneously striving for goals in multiple domains. Prior to our study, SC model research had examined autonomous and controlled goal motives in relation to a single goal. However, goal pursuit in everyday life is more complicated, often including the pursuit of multiple goals at any given time (Louro et al., 2007). As such, we explored how the motives underpinning goals might explain inter-goal relations (Riediger & Freund, 2004) when simultaneously pursing multiple goals. The research presented in Chapter 5 is of great applied importance, and represents an important advancement of the SC model research to date.

The study reported in Chapter 5 presented a further addition to the literature; that is the use of goal motives profiles to examine different combinations of autonomous and controlled goal motives. This allowed us to examine the interaction between the two types of goal motives, and understand the implications for goal striving when individuals have high levels of both autonomous and controlled motives, compared with more adaptive profiles (e.g. high autonomous, low controlled motives). We investigated goal motives and multiple goal striving in student athletes pursuing goals in sport and their studies, as this population often

struggles to manage the competing demands of simultaneous goal striving in these domains (Cosh & Tully, 2014).

Using latent class analysis, we identified three distinct goal motives profiles. Class 1 reported moderate autonomous and moderate controlled motives for both goals. Within Class 2, which represented the largest proportion of the sample (48.7%), individuals reported relatively higher autonomous and lower controlled motives for both goals. This profile was deemed the most adaptive based on the theoretical propositions of the SC model suggested by Sheldon and Elliot (1999). Individuals in Class 3 reported relatively higher autonomous and higher controlled motives for both goals.

When examining the between-class differences in inter-goal relations, we found that those with higher levels of autonomous motivation experienced greater facilitation from their academic goal to their sporting goal than the profile with moderate autonomous motives. However, we found no evidence of goal motives being associated with facilitation from the sporting goal to the academic goal. Similarly, there were no differences between the profiles in the level of interference reported between their academic and sporting goals.

The findings mirror those within the wider SDT literature. Research has shown that higher autonomous motivation is associated with a range of positive outcomes, regardless of the level of controlled motivation reported (Langan et al., 2015; Ratelle et al., 2005; Ullrich-French & Cox, 2009; Vansteenkiste et al., 2009). Thus, when engaging in multiple goal pursuit, individuals (and potentially important others providing support) should try to maximise autonomous goal motives.

The results presented in Chapter 5 provide an initial investigation into the relationship between goal motives and inter-goal relations in multiple goal pursuit, however there are also important questions which remain unanswered. For example, we only found differences for

the academic goal pursuit facilitating sporting goal pursuit. This could be explained by research which suggests that student athletes may prioritise their sporting commitments to the detriment of their academic studies (Cosh & Tully, 2014). It is also of interest that there was not a profile where individuals had high autonomous and low controlled motives for one goal, and the opposite relationship (e.g. low autonomous, high controlled) for the other. It would be interesting to explore how such conflict within goal motives might impact conflict in goal pursuit.

Practical implications

The findings of the research presented in this thesis have important practical implications for individuals engaged in goal striving. The findings are also relevant to those providing support to others in goal pursuit, such as coaches supporting their athletes. While we have used sport as a context for all of the studies within this thesis, we might expect that the findings could be applied to individuals engaged in goal striving in any achievement settings.

A clear implication of the present findings is the importance of autonomous motives for goal pursuit, particularly when facing challenges. Goal striving is rarely without obstacles and our work demonstrates that, in general, when individuals have more adaptive goal motives they are better prepared to overcome these challenges. In particular, the findings of the research in Chapter 2 support previous research (e.g. Ntoumanis, Healy, Sedikides, Duda et al., 2014, Study 1) which demonstrates the benefits of autonomous motives when striving for increasingly difficult goals. Furthermore, our work supports previous studies which have demonstrated that autonomous goal motives are associated with positive outcomes for goal attainment and well-being (Koestner et al., 2008; Miquelon & Vallerand, 2008; Sheldon & Elliot, 1999; Smith et al., 2007). Additionally, we have demonstrated how goal motives can

have a protective effective, as individuals with higher autonomous motives were found to have lower levels of psychological, physical and psychobiological ill-being. Finally, we have shown that when simultaneously pursuing goals in multiple domains, individuals with higher autonomous motives may experience more facilitation between their goals, regardless of the level of controlled motives reported.

In this thesis, we have clarified previously unclear research (e.g. Smith et al, 2007, 2011) regarding the impact of coach behaviours on athlete goal motives. This is important for coaches supporting athlete goal setting, and supports work in the wider SDT literature about brighter and darker sides of athletic involvement (Adie et al., 2008; Bartholomew et al., 2011a; Bartholomew et al., 2011b). Our findings suggest that when coaches employ autonomy-supportive behaviours and limit the use of controlling strategies, athletes will be more likely to strive with autonomous motives and to experience benefits for their psychological, physical and psychobiological well-being. Within the literature there is advice for coaches on how to promote autonomy-supportive behaviours (Mageau & Vallerand, 2003; Ntoumanis & Mallett, 2014). Additionally, a recent meta-analysis of autonomy-support interventions in education setting has shown how teachers can adapt their behaviour to better support learners (Su & Reeve, 2011). There is, however, a lack of intervention-based research within the published literature which demonstrates how coaches can adapt their behaviour to be more autonomy-supportive and less controlling (Occhino, Mallett, Rynne, & Carlisle, 2014). Given that the present thesis highlights how important coach behaviours are in facilitating adaptive (and maladaptive) goal striving, more intervention-based research is needed to help coaches develop the knowledge, skills and awareness to support their athletes in adaptive goal pursuit.

Despite the aforementioned limitations to the current literature, there are important implications which can be drawn from this research for coaches who are supporting athletes to be successful in their goal striving. As demonstrated by the research presented in Chapter 2, goal motives can be primed by exposure to other individuals engaged in goal striving with either autonomous or controlled goal motives. As such, coaches need to carefully consider how they might prime the goal motives of the athletes with which they are engaging. This might be through their own goal striving (in line motivation contagion effects; Radel et al., 2010). For example, the research presented within this thesis suggests that if coaches are perceived to be pursuing their own goals with autonomous motives, athletes working with this coach may also striving for their goals with autonomous motives. Within this research, the participants were not personally familiar with the actors in the primes. Despite this, exposure to the primes lead to behavioural (e.g. persistence) and cognitive (e.g. changes in positive affect, interest in future goal striving) outcomes in line with previous research (e.g. Ntoumanis, Healy, Sedikides, Duda, et al., 2014; Study 1). Given the important influence a coach can have on an athlete's overall sport experience (Mageau & Vallerand, 2003), it is plausible that priming effects may be stronger is an athlete perceives their coach to be pursuing goals with either autonomous or controlled motives. It would be worthwhile to explore this notion within future research.

A further implication which can be drawn from the priming of goal motives is the importance of the language used by coaches when engaging with athletes. In the goal motives primes, the actors merely described their upcoming participation without actually performing the task. This may be an important point for coaches to consider when setting goals for their athletes. In other words, coaches should carefully describe goals (and tasks which may lead to successful goal attainment) to athletes, focussing on aspects such as the potential benefits and

elements of enjoyment. This suggestion aligns with the principles of autonomy-supportive coaching behaviours outlined by Mageau & Vallerand (1997), specifically with their recommendation for coaches to provide rationale for tasks and activities. However, to the best of our knowledge, this research is the first to suggest that the way coaches speak with their athletes can prime the motives with which athletes pursue their goals. Given the importance of communication between coaches and athletes (Rhind & Jowett, 2010), it seems crucial that coaches consider how their choice of words might influence (positively or negatively) athletes' goal pursuit.

There are also direct implications which can be drawn from the research in Chapter 5. In life, individuals are constantly striving for multiple goals, both within and across domains (Louro et al., 2007). Furthermore, individuals can experience facilitation or interference between their multiple goal pursuits. Our findings provide initial support for the benefits of autonomous goal motives for inter-goal facilitation. When individuals can identify importance or enjoyment in their goal pursuits (thus striving with higher autonomous motivation), they may experience greater facilitation from one goal to another. This finding was irrespective of the level of controlled goal motives reported. Overall, these findings suggest that individuals should focus on enhancing autonomous motives, rather than decreasing controlled motives, for multiple goal pursuits as this can lead to positive goal-related outcomes.

Limitations and future research directions

There are numerous strengths of the research conducted in the present thesis. First, the empirical chapters explore the role of goal motives and self-regulation using experimental, longitudinal and cross-sectional work. In general (with the exception of the research in Chapter 3), these studies have supported the central hypothesis of the benefits of autonomous goal striving across a range of methodologies. As such, this thesis provides considerable

strength to the existing research. Additionally, we have incorporated several measures and constructs not previously explored in relation to goal motivation (e.g. controlling coach behaviours, psychological need thwarting, physical and psychobiological ill-being, interest in future goal striving, inter-goal relations). Chapters 2-4 used a combination of self-report and objective measurements, which reduces the potential for the analyses to be confounded by common method variance. Finally, our statistical analyses were carefully conducted, using appropriate (and often advanced) statistical methods.

Despite the numerous strengths of the research presented within this these, there are also limitations which should be acknowledged. First, while several new measures were incorporated, there are others which may be pertinent for future research. For example, Smith et al. (2015) have recently developed and validated the test scores of an observation system which enables the objective assessment of coach behaviours (including those outlined in SDT). It may be worthwhile for future research to observe coaches during training and matches, and examine how this might relate to athlete ratings of autonomous and controlled goal motives.

A further limitation of the present research is that we have not examined the interaction between personal and contextual motivation. Lisjak, Molden, and Lee (2012) demonstrated that conflict between primed and personal motivational orientations has negative implications for a range of outcomes. This is of high relevance to the present research. At a methodological level, it is important to understand how personal goal motives might impact the effectiveness of goal motives primes. From an applied perspective, while we explored how coaches can impact goal motives through the satisfaction or thwarting of the basic psychological needs, research has not yet explored the interactive effects of the social

environment and personal goal motives on outcomes such as goal attainment. It would be worthwhile to explore this in future research.

Future research may also wish to address the limitations outlined in Chapter 3 related to the impact of primed goal motives for failed and unattainable goals. Presently, the role of goal motives (primed or personal) in the behavioural and affective responses to goal failure remains unclear. Given that physical activity is known to enhance executive function, and goal failure can hinder such processes, it may be worthwhile for future research to directly explore if physical activity can protect against the impact of goal failure. Furthermore, it would be beneficial to explore how failure in a physical, but not exertional goal, can impact performance in a subsequent physical task. For example, research could explore how a golfer failing the make the green from their tee shot impacts their subsequent putting performance. Finally, research has shown that personal goal motives can impact the self-regulatory responses to unattainable goals (e.g. cognitive disengagement and reengagement; Ntoumanis, Healy, Sedikides, Smith, et al., 2014). The impact of primed goal motives in such situations is as yet unknown.

A significant conceptual advancement of the SC model literature would be to explore the role of implicit (or unconscious) motives (McClelland, Koestner, & Weinberger, 1989). To date, goal motives research has exclusively explored conscious goal pursuit and explicit motives. Indeed, while the work presented in Chapters 2 and 3 explores the priming of goal motives, these primes were presented at a conscious supraliminal level. It has recently been suggested that the explicit motives with which an individual strives for their goals may not reflect the implicit motives which are a core (and possibly unconsciousness) part of their self-identity (Sheldon, 2014). This incongruence between implicit and explicit motives could be a product of long-term exposure to an environment which does not promote optimum

functioning (for example, working with a coach who is high in controlling and low in autonomy-supportive behaviours; Bartholomew et al., 2011a). While Sheldon (2014) has suggested using perceived locus of causality (PLOC) to assess implicit goal motives, this still relies on an individual's ability to accurately self-report their core motives. Research which can effectively explore the individual and interactive effects of implicit and explicit goal motives in goal pursuit would be a worthwhile extension of the literature.

In addition to the aforementioned conceptual extensions of the present research, another worthwhile venture for future studies would be the implementation and evaluation of developing adaptive goal motivation, particularly within sport. To the best of our knowledge, and in spite of the growing body of research, there are no studies within a sporting context which have explored how to help individuals become more autonomous in their goal strivings. Indeed, it has been established in other contexts that personal (Koestner et al., 2002) and primed goal self-concordance (Chatzisarantis, 2010) in conjunction with implementation intentions (Gollwitzer, 1999) were more effective for goal pursuit than goal self-concordance alone. This may be particularly pertinent when examining how goal motives impact the responses to unfulfilled or failed goals, as Masicampo and Baumeister (2011b) demonstrated that implementation intentions can alleviate the impact of unfulfilled goals on cognitive processes. Given the importance and prevalence of goal setting in sport (Weinberg, 2013), it seems imperative that intervention studies are conducted within this context. This would enhance our understanding of how to promote and develop adaptive goal striving. Given that the present research (e.g. Chapters 2 and 4) and that of other colleagues (e.g. Smith et al., 2007, 2010, 2011) have shown how goal motives can be influenced by contextual factors, it may be worthwhile exploring interventions with coaches to promote adaptive goal striving in athletes. Contagion effects have been shown in both motivation (Radel et al., 2010) and goal

adoption (Aarts et al., 2004), therefore it is plausible that coach level interventions may lead to benefits in developing adaptive motives in athletes.

Building on the research presented in Chapter 5, it would be interesting if future research could further investigate goal motivation profiles in relation to a range of outcomes. Through our work, we have demonstrated that individuals can strive for goals with different combinations of autonomous and controlled motives. For example, some individuals may have high autonomous and low controlled motives for their goals. Equally, our work has shown that some people report high levels of both types of goal motivation. To the best of our knowledge, our work is the first to examine the impact of such differences in goal motives profiles. Our findings show that high controlled goal motives are not necessarily detrimental to inter-goal relations, as long as individuals also report high levels of autonomous goal motives. It would be worthwhile for future research to examine if similar findings are shown in relation to outcomes such as goal persistence, goal attainment and well-being.

Finally, given that this research has been conducted within sport, it may be appropriate for future research to examine the replicability of these findings in other contexts. From a theoretical perspective (Deci & Ryan, 2000), it could be expected that autonomous goal motivation would lead to greater goal attainment, higher well-being, and more adaptive inter-goal relations in all contexts. However, it is important that this is directly examined in empirical research. Replications of our findings in other contexts (such as education, careers, health or business) would add further support to the benefits of autonomously motivated goal strivings.

Conclusion

The findings presented in this thesis have mostly supported the major principles of the SC model. In three out of the four studies presented, we have demonstrated that autonomous

goal motives can lead to positive behavioural, cognitive and affective outcomes. The findings presented in Chapter 3 do not support the benefits of goal striving with autonomous motives, however equally they do not suggest that such motives have a negative impact on the responses to goal failure. Within the thesis, we have advanced the extant literature by incorporating contextual factors such as primed goal motives, and examined the impact of these primes in relation to goal persistence and goal failure. We have clarified the relations between coach behaviours, psychological need satisfaction and thwarting, goal motives and well- and ill-being using novel measures. Furthermore, we have presented the first investigation of how goal motives are associated with inter-goal relations when pursuing goals in multiple domains. In light of our findings, we have discussed practical implications and suggested potential avenues for future research. Overall, the research presented within this thesis generally supports the benefits of autonomous motives, and the disadvantages of controlled motives, for goal-related outcomes and well-being.

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APPENDICES

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Appendix 1: Chapter 2 materials

Advert

SPORT PSYCHOLOGY EXPERIMENTS

Motivation and Goal Striving

We are currently conducting a study examining the effects of personal motivation on goal striving and goal attainment. For this study we would like to recruit regularly training athletes from **any sports except cycling and triathlon**, who train at least once a week. The study will involve using a cycle ergometer in one of the sport psychology labs and uses a multi-stage exercise trial. To complete each stage and move to the next one, you will need to maintain a minimum RPM for the whole stage. The intensities of each stage will be adapted based on your personal fitness levels. You will be screened for physical health problems (via a questionnaire) prior to your participation in the sudy.

You can get ONE hour course credit just for a being a participant!!!!

If you need more information about the study or would like to participate, please contact Laura Healy (lch147@bham.ac.uk; [redacted]). The principal investigator for this project is Dr. Nikos Ntoumanis, whom you can contact via email (N.Ntoumanis@bham.ac.uk) or phone ([redacted]).

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Participant Information Sheet

Motivation and Goal Striving Study

Information Sheet

Thank you for considering participation in this project, which has been approved by the University of Birmingham's Life and Health Sciences Ethical Review Committee. The aim of this project is to investigate motivational factors affecting goal striving in sport. We are primarily interested in success and failure experiences and reactions to those experiences when striving for a particular goal in a sports task. The following information will provide you with further details about the study.

If you agree to participate in this study you will be required to complete a single laboratory session lasting approximately 60 minutes, during which you will perform exercise using a cycle-ergometer. You will be screened for physical health problems (via a questionnaire) prior to your participation in the study. There are no particular adverse health risks from the task used in the studies beyond the health risks associated with any type of high intensity physical activity. The study uses an experimental protocol involving a cycle-ergometer task in one of the sport psychology labs. You will first complete a 3 minute maximal exertion test and then participate in the main trial which involves a multi-stage exercise trial, with 10 stages each lasting 2 minutes. To complete each stage and move to the next one, you will need to maintain a set intensity and speed for a given time. If you are successful in attaining the goal in a stage you will progress to the next stage. If you are unsuccessful you will not need to complete further stages. In addition to the cycling trial, you will be required to complete psychological questionnaires focussing upon your motivation, psychological well-being, and your reactions to success and failure. There will also be a memory task based on a video you will be asked to watch.

We are aware that participants' performances in the trials and their responses to psychological questionnaires will vary. We are interested in the variation in these responses. **All responses to psychological measures will remain anonymous. Consequently, we would be grateful if you were honest in your responses.** In accordance with the Data Protection Act (1998), the physical activity readiness questionnaire, the only non-anonymous questionnaire in this study, will be kept securely (and will only be accessed by the study investigators) for a period of ten years following completion of the study. All anonymous questionnaires will be kept for a period of two years. If you wish to access your physical activity readiness questionnaire at any time you may do so through written contact with Dr. Ntoumanis. If you wish to access the anonymous psychological questionnaires at a later stage, you would need to include on the front page of the questionnaire a code word (that only you will know what it means) in order to allow the questionnaires to be identified at a later stage. Please note, your participation in this study is also voluntary and you may withdraw at any time, without explanation.

If you have any queries regarding any aspect of this study please contact Laura Healy on [redacted] or at lch147@bham.ac.uk, or Dr. Nikos Ntoumanis on [redacted] or at N.Ntoumanis@bham.ac.uk.

Consent form

Motivation and Goal Striving Study

Consent Form

Investigators
Laura Healy
Dr. Nikos Ntoumanis
Prof. Joan Duda
Dr. Brandon Stewart

I have read the above information and I am willing to take part in this investigation. I am aware that if I have any queries about the investigation I can contact Laura Healy or Dr. Nikos Ntoumanis using the contact details provided above. I understand that I am free to stop/ withdraw at any time without having to give an explanation.

Full Name (please print clearly) ……

Signed …….

Witnessed …….

Date ……..

Name: .....
Address: .....
.....
.....
Phone: .....
Email: .....

Chapter 2 Questionnaires

Motivation and goal striving study

What is your date of birth? .....

What is your gender? .....Male .....Female

What is your **current** (main) sport? .....

How many hours per week do you **train** in this sport, on **average**? .....hours per week

What is your **current** playing/competing level in this sport (please circle all that apply)?

Local University Regional National International

Including spinning and gym cycling, how many hours per week do you cycle?.....hours per week

Have you ever had any training in psychological skills (self-talk, imagery, relaxation etc)? This could include sport psychology workshops, lectures as a part of your degree or any other training. If yes, please give details below.

.....
.....
.....
.....
.....

Section 1 - Before the experiment:

The following questions relate to how you feel **right now**. **Please be completely honest** about your responses to **how you feel right now.**

Indicate how you feel right now:	**Do Not Feel**	**Feel Slightly**	**Feel Moderately**	**Feel Strongly**	**Feel Very Strongly**
Enthusiastic	1	2	3	4	5
Happy	1	2	3	4	5
Upbeat	1	2	3	4	5

Section 2 – Following the maximal test

You are about to engage in a multistage exercise trial on a cycle ergo-meter. There are 10 stages of increasing difficulty which each stage lasting for 2 minutes. Each stage requires you to cycle at a given intensity for the duration of the stage. In order to complete the stage, you must maintain at least 70 revolutions per minute (RPM) for the duration of every stage. If you maintain this, you will progress to the next stage. If your RPM drops below 70 RPM for more than 5 seconds, the trial will end. You can also choose to withdraw your participation at any point.

In order to account for differences in initial fitness levels, the stages are set at intensities based on a percentage of **your** mean power output, as determined by the maximal test you have just completed. The stages in the exercise trial are difficult but are achievable for all participants. The main interest in the study is how individuals strive towards their goals in the multi-stage exercise trial. We are **NOT** focussed on your level of fitness.

YOUR GOAL FOR THIS TASK IS TO COMPLETE ALL 10 STAGES OF THE TEST.

The following questions relate to your **perception** of **your goal** for this trial. **Please answer honestly** the following questions relating to **how you feel** about your goal.

*Answer the following questions in relation to your **goal** in the **multi-stage fitness trial**:*	**Not at all**			**Moderately**			**Very**
How difficult is your goal?	1	2	3	4	5	6	7
How challenging is your goal?	1	2	3	4	5	6	7
How hard is your goal?	1	2	3	4	5	6	7
How strong is your belief that you are able to achieve your goal?	1	2	3	4	5	6	7
How important is it to you that you achieve your goal?	1	2	3	4	5	6	7
How confident are you that you will achieve your goal?	1	2	3	4	5	6	7
	Not at all			**Moderately**			**Very much so**
To what extent do you believe that you are capable of achieving this goal?	1	2	3	4	5	6	7
How much do you value achieving your goal?	1	2	3	4	5	6	7
To what extent do you think that achieving your goal is important?	1	2	3	4	5	6	7

Out of the 10 stages in the trial, how many of them do you expect to achieve?.....

In addition to participating in the multi-stage cycling trial, you will shortly be asked to watch a video of a participant in another study. This is part of a separate study we are running which is investigating the influence of high-intensity exercise (i.e. the maximal test you have just performed) on memory function. Following the video, you will start the multi-stage cycling trial. At the end of this trial, your memory will be tested using some simple questions relating to what is said by the person in the video.

Section 3 - After the experiment:

The following questions relate to how you feel **right now** following the multi-stage exercise trial. **Please be completely honest** about your responses to **how you feel right now.**

Indicate how you feel right now:	**Do Not Feel**	**Feel Slightly**	**Feel Moderately**	**Feel Strongly**	**Feel Very Strongly**
Enthusiastic	1	2	3	4	5
Happy	1	2	3	4	5
Upbeat	1	2	3	4	5

Please answer honestly the following questions relating to your participation in the study.

Following my participation in this study:	**Not at all**			**Somewhat**			**Very much so**
I would be interested in participating in this study again in the future.	1	2	3	4	5	6	7
I would recommend this study to my friends.	1	2	3	4	5	6	7
I would be interested in participating in other studies like this one in the future.	1	2	3	4	5	6	7

Section 4 – Memory questions

Please think back to the **video you have watched**. **Please answer honestly** to **how you think the participant felt** when describing the activity they were about to complete.

To what extent did the participant in the video suggest that they:	**Not at all**			**Moderately**			**Very much so**
Expected to enjoy the activity they were about to do.	1	2	3	4	5	6	7
Were going to try and achieve their goal to avoid feeling guilty.	1	2	3	4	5	6	7
Felt the activity in their trial was personally important to them.	1	2	3	4	5	6	7
Were completing the activity because of a research hour or payment.	1	2	3	4	5	6	7

Please answer the following questions regarding the video you watched before starting the multi-stage exercise trial.

What was described by the participant in the video?	
What was the participant's first name?	
What was the participant asked to do in the trial they described?	
Did it seem that the participant understood what they had to do?	

Section 5 – Experiment review and feedback form

1. What do you think the purpose of this experiment was?

2. What do you think this experiment was trying to study?

3. Did you think that any of the tasks you did were related in any way? If "yes" in what way were they related?

4. Did anything you did on one task affect what you did on any other task? If 'yes' how did it effect you?

5. What were you trying to do while watching the video on the computer monitor?

Thank you very much for you participation!

Data collection sheet

Age -

Resting HR -

3 min maximal test

1.	**4.**	**7.**	**10.**	**13.**	**16.**
2.	**5.**	**8.**	**11.**	**14.**	**17.**
3.	**6.**	**9.**	**12.**	**15.**	**18.**

Mean =

Main Protocol – 10 stages

Stage	**% workload**	**Time (secs)**	**Watts**	**HR**	**Completed**
1	50	120			
2	60	120			
3	70	120			
4	73	120			
5	76	120			
6	80	120			
7	83	120			
8	86	120			
9	90	120			
10	95	120			

Chapter 2 Experimental Protocol

1. Prior to arriving in the laboratory, participants were sent an information sheet and consent form for the study, which they were asked to bring with them on the day of participation. This included a health screening questionnaire which ensure participants were in an appropriate physical condition to be involved in the study.
2. On arrival in the laboratory, participants were fitted with a polar heart rate monitor. They then completed a pre-test measures of affect, after which time resting heart rate measurements were recorded.
3. A 3 minute warm up was completed by all participants. The resistance on the cycle ergometer was set at 60 Watts (W) and participants were asked to maintain a pedal cadence of 60 revolutions per minute (RPM). This was to familiarise the participants with the cycle ergometer and to make any necessary adjustments to the seat and handle bar positions.
4. Participants then completed a 3-minute maximal test where they were ask to cycle as fast as possible for as long as possible. During this time, the resistance on the bike was set at 100W and the power output was recorded every 10 seconds. This allowed us to set individualised work rates for the main trial, and also to standardise for gender and fitness levels. Following this maximal trial, participants performed 5 minutes of active recovery on the cycle ergometer, and 10 minutes of seated rest.
5. During the seated rest period, participants were informed of their goal for the main trial and completed measures of goal difficulty, goal efficacy and goal importance. Following the completion of these measures we presented the prime.
6. The primes were presented using the cover story that they were a part of a separate study investigating the impact of exercise on memory. As such, they were informed to

carefully watch the video, as they would be required to answer questions later in the experiment. Participants watched the primes on a computer screen.

7. At the end of the prime, participants started the main experimental trial. This consisted of 10 x 2-minute stages. The goal was to complete all 10 stages. The trial would be ceased if: a) the participants chose to withdraw; b) the pedal cadence dropped below 70 RPM for longer than 5 seconds or c) the participant's heart rate exceeded their age-predicted maximum (220-age). Heart rate was monitored throughout, and recorded in the final 15 seconds on each stage.
8. When the trial ceased (for any of the reasons listed above), the resistance on the bike was lowered and participants completed a cool down. This continued until their heart rate returned to around 120-130 bpm.
9. Following the cool down, participants completed the post-trial questionnaires. This included post-trial affect, interest in future tasks, memory questions related to the prime, perceptions of the actor's motivation in the prime and a funnelled debriefing to identify participants who suspected the prime. Following the completion of these measures, participants were thanked for their participation and were free to leave the laboratory.

Appendix 2: Chapter 3 materials

Advert

Sport Science Experiments

Task performance in athletes

We are currently conducting a study investigating performance in attributes which are thought to be important for successful team sport athletes. For this study we would like to recruit regularly training athletes from any sports (e.g. athletics, swimming, hockey, football, netball) **except cycling and triathlon**, who train at least once a week. The study will involve a task on a cycle ergometer in one of the sport psychology labs. During this trial, you will try to cover a distance goal individually tailored to you. The study will involve computer and simple movement tasks investigating performance under pressure and spatial awareness. You will also be asked to complete some questionnaires. You will be screened for physical health problems (via a questionnaire) prior to your participation in the study.

You can get ONE hour course credit just for a being a participant!!!!

If you need more information about the study or would like to participate, please contact Laura Healy (lch147@bham.ac.uk). The principal investigator for this project is Prof. Nikos Ntoumanis, whom you can contact via email (N.Ntoumanis@bham.ac.uk) or phone ( ).

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Participant Information Sheet

Task performance in athletes

Information Sheet

Thank you for considering participation in this project, which has been approved by the University of Birmingham's Life and Health Sciences Ethical Review Committee. The aim of this project is to investigate performance on attributes thought to be important for athletes. The following information will provide you with further details about the study.

If you agree to participate in this you will be required to complete a laboratory session lasting approximately 60 minutes. In the session, you will perform a sub VO2max test using a cycle ergometer. You will also perform a goal-based fitness test on the cycle ergometer where you will have to achieve a certain distance goal. Following this trial, you will be asked for perform on physical based task investigating performance under pressure, and one computer based task examining spatial awareness. You will also watch a video which is a part of an unrelated study investigating memory and exercise. In addition to the physical trials, you will be required to complete psychological questionnaires focussing upon your motivation, psychological well-being, and your reactions to success and failure. You will be screened for physical health problems (via a questionnaire) prior to your participation in the study. There are no particular adverse health risks from the task used in the study beyond the health risks associated with any type of moderate intensity physical activity.

We are aware that participants' performances in the time trials and their responses to psychological questionnaires will vary. In addition to the fitness levels of participants, we are interested in the variation in the psychological responses. **All responses to psychological measures will remain anonymous. Consequently, we would be grateful if you were honest in your responses.** In accordance with the Data Protection Act (1998), the physical activity readiness questionnaire, the only non-anonymous questionnaire in this study, will be kept securely (and will only be accessed by the study investigators) for a period of ten years following completion of the study. All anonymous questionnaires will be kept for a period of two years. If you wish to access your physical activity readiness questionnaire at any time you may do so through written contact with Prof. Ntoumanis. If you wish to access the anonymous psychological questionnaires at a later stage, you would need to include on the front page of the questionnaire a code word (that only you will know what it means) in order to allow the questionnaires to be identified at a later stage. Please note, your participation in this study is also voluntary and you may withdraw up until 31st May 2014 (after which the data will be analysed), without explanation. If you choose withdraw your data will be destroyed and permanently deleted immediately.

If you have any queries regarding any aspect of this study please contact Laura at lch147@bham.ac.uk, or Prof. Nikos Ntoumanis on [redacted] or at N.Ntoumanis@bham.ac.uk.

Consent form

Task performance in athletes

Consent Form

Investigators

Laura Healy
Prof. Nikos Ntoumanis
Prof. Joan Duda
Dr. Brandon Stewart

I have read the above information and I am willing to take part in this investigation. I am aware that if I have any queries about the investigation I can contact Laura Healy or Prof. Nikos Ntoumanis using the contact details provided above. I understand that I am free to stop/ withdraw at any time up until 31st May 2014, without having to give an explanation.

Full Name (please print clearly) ……

Signed …….

Witnessed …….

Date ……..

Name: .....
Address: .....
.....
.....
Phone: .....
Email: .....

Chapter 3 Questionnaires

Task performance in athletes

Section 1 - Before the experiment:

What is your date of birth? .....

What is your gender? .....Male .....Female

What is your **current** (main) sport? .....

How many hours per week do you **train** in this sport, on **average**? .....hours per week

What is your **current** playing/competing level in this sport (please circle all that apply)?
Local University Regional National International

Including spinning and gym cycling, how many hours per week do you cycle?.....hours per week

Section 2 – Prior to the cycling trial

You are going to complete an 8 minute fitness test using a cycle ergometer. The test will require you to achieve a goal of cycling a certain distance within 8 minutes. This goal is based on the distance you achieved in the two minute baseline trial you have just completed.

The following questions relate to your **perception** of **your goal** for this trial. **Please answer honestly** the following questions relating to **how you feel** about your goal.

*Answer the following questions in relation to your **goal** in the **cycling trial**:*	**Not at all**			**Moderately**			**Very**
How difficult is your goal?	1	2	3	4	5	6	7
How challenging is your goal?	1	2	3	4	5	6	7
How hard is your goal?	1	2	3	4	5	6	7
How strong is your belief that you are able to achieve your goal?	1	2	3	4	5	6	7
How important is it to you that you achieve your goal?	1	2	3	4	5	6	7
How confident are you that you will achieve your goal?	1	2	3	4	5	6	7
	Not at all			**Moderately**			**Very much so**
To what extent do you believe that you are capable of achieving this goal?	1	2	3	4	5	6	7
How much do you value achieving your goal?	1	2	3	4	5	6	7
To what extent do you think that achieving your goal is important?	1	2	3	4	5	6	7

In addition to participating in the cycling trial, you will shortly be asked to watch a video of a participant in another study. This is part of a separate study we are running which is investigating the influence of exercise (i.e. the trials you are about to perform) on memory function. Following the video, you will start the cycling trial. At the end of this trial, your memory will be tested using some simple questions relating to what is said by the person in the video.

Section 3 - After the main trial

Did you succeed in achieving your goal?

☐ **Yes** (please go to Section 4)

☐ **No** (please answer questions below)

At what point during the last trial did you realise you **could not** attain your goal?
.....
.....

Section 4 – Memory questions

Please think back to the **video you have watched**. **Please answer honestly** to **how you think the participant felt** when describing the activity they were about to complete.

To what extent did the participant in the video suggest that they:	**Not at all**			**Moderately**			**Very much so**
Expected to enjoy the activity they were about to do.	1	2	3	4	5	6	7
Were going to try and achieve their goal to avoid feeling guilty.	1	2	3	4	5	6	7
Felt the activity in their trial was personally important to them.	1	2	3	4	5	6	7
Were completing the activity because of a research hour or payment.	1	2	3	4	5	6	7

Please answer the following questions regarding the video you watched before starting the cycling trial.

What was described by the participant in the video?	
What was the participant's first name?	
What was the participant asked to do in the trial they described?	
Did it seem that the participant understood what they had to do?	

Section 5 – Experiment review and feedback form

1. What do you think the purpose of this experiment was?

2. What do you think this experiment was trying to study?

3. Did you think that any of the tasks you did were related in any way? If "yes" in what way were they related?

4. Did anything you did on one task influence what you did on any other task? If 'yes' how did it effect you?

5. What were you trying to do while watching the video on the computer monitor?

6. Do you have any comments about any aspect of the study (e.g. protocol, feedback provided, questionnaires used)?

Thank you very much for you participation.

Trail making task instructions

Trail making task

a) Part A
   i) In this task I'd like you to draw a line connecting the numbers as quickly as you can. Start with number one, then go to two, three, four, etc. Continue until you reach the highest number. **Each # is in a direct line-of-sight.** Try not to lift your pen off the page. Here's a sample so you can practise.

   ii) Good. Now here is the full task. Please remember to complete it as quickly as you can. **Record time**: _____

   iii)
b) Part B
   i) This task is similar, but here you need to draw a line connecting both numbers and letters. Numbers and letters need to be connected alternately, for example, from number 1 to A to 2 to B to 3 to C etc. Again, try not to lift your pen off the page. Here's a sample so you can practise.

   ii) Good. Now here is the full task. And remember to alternate between numbers and letters, and to complete it as quickly as you can. **Record time**: _____

Data collection sheet

Resting HR - Age -

Submax Test

Stage	Watts	HR
1	50	
2	75	
3	100	
4	125	

Cycling

2 minute distance cycling	
8 minute goal cycling	

Main Trial

Time	HR	RPE	Leg RPE	Goal Attainment Expectancy	Distance Covered
1					
2					
3					
4					
5					
6					
7					
8					

Secondary tasks

	Trial 1	Trial 2	Trial 3
Buzzer task			
Time			
Error			
Score			
Trail making test			

Chapter 3 Experimental Protocol

1. On arrival to the laboratory, participants were fitted with a heart rate monitor, and completed consent forms and health questionnaires in order to ensure they were in a suitable physical condition to participate in the experiment. Resting heart rate was taken during this time.
2. Participants completed a 2-minute warm up on the cycle ergometer. The resistance on the bike was set at 60 Watts (W) and the participants were asked to maintain a cadence of 60 revolutions per minute (RPM). This warm up was performed in order to familiarise the participants with the equipment and to make any necessary adjustments to the seat and handlebar position.
3. Following the warm up, participants performed an 8-minute submaximal test. This consisted of four 2-minute stages where the participant maintained 60RPM. In the first stage, the resistance on the bike was set at 50 W. The resistance increased by 25 W at each stage, up to 125 W in the final 2 minutes. Heart rate was recorded in the final 15 seconds of each stage.
4. We extrapolated the recorded heart rates against the workload for each stage. This enabled us to calculate the workload required for a participant to be working at 50% of their age-predicted maximum heart rate (220-age). The load on the bike was henceforth set at 50% of the participant's maximum.
5. Participants then completed a 2-minute trial, where the goal was to cover as much distance as possible in the two minutes. We recorded the distance covered during this trial and used this to calculate the distance to be covered in the 8-minute trial. Specifically, we multiplied the 2-minute distance by 4, and then slightly adjusted so that the 8-minute goal constituted 95% of this distance.

6. Following the 2-minute trial, participants came off the cycle ergometer and were informed of their goal. They then completed measures of goal difficulty, goal efficacy and goal importance. Following this, they were exposed to the prime in the manner described in Chapter 2. Within this study, we only used the autonomous and controlled prime.
7. After being exposed to the prime, participants began the 8-minute trial. During this trial, manipulated feedback was shown to all participants on a computer screen. This was updated every minute, and displayed:
    a. The distance covered
    b. The distance remaining to reach their goal
    c. The percentage of their goal they had covered
    d. The percentage that they were expected to have achieved if they were on course to achieve their goal
    e. The remaining time
8. During the trial, we recorded perceptions of goal attainment expectancy every 2 minutes. We also monitored heart rate to ensure that this did not exceed the participant's age predicted maximum.
9. At the end of the 8-minute trial, participants continued cycling at a low intensity to allow their heart rate to return to 120-130 bpm. Following this, participants came off the bike and were asked if they had achieved their goal. This was used to maintain our cover story.
10. Participants then completed the secondary tasks (buzzer trial, trail making test, anti-saccade test) which were presented to participants in a randomly assigned order.

11. Following the completion of the secondary tasks, participants answered the memory questions, perceptions of actor goal motivation and funnelled debriefing. They were then thanked for their participation and were free to leave the lab. Full debriefing, which detailed the manipulations, was performed via email once data had been collected from all participants.

Appendix 3: Chapter 4 materials

Participant Information Sheet

Motivation and Goal Striving Study

Information Sheet

Thank you for considering participation in this project, which has been approved by the University of Birmingham's Science, Technology, Engineering and Mathematics Ethical Review Committee. The aim of this project is to investigate motivational factors affecting goal striving in sport. We are primarily interested in how coaches' behaviour and an individual's motivation for their goals can impact on goal striving over the course of the season. The following information will provide you with further details about the study.

If you agree to participate in this study you will be required to complete a collection of questionnaires at two times over the season. These questionnaires will be completed at a time agreed with you and your team (e.g. before a training session) at the beginning and end of the season. The questionnaires will include questions relating to your coach, your goals for the season, your responses to challenges when trying to reach your goals, as well as your physical and psychological well-being. The questionnaires should take between 10 and 20 minutes to complete. You may also be asked to provide a saliva sample at the beginning and to measure physical well-being. These will be stored using an unique ID number until the analyses are carried out.

We will match your responses across the different time points using your date of birth and demographic information. Your name, or any other personal information, will only be included on consent forms and not on any of the questionnaires. None of your responses will be shared with your coach, teammates, or anyone else except the researchers conducting this project. **Consequently, we would be grateful if you were honest in your responses.** All data will be kept for a period of ten years. Please note, your participation in this study is voluntary and you may withdraw at any time without explanation, up until the 31st May 2013, after which the data will been analysed.

If you have any queries regarding any aspect of this study please contact Laura Healy on [redacted] or at lch147@bham.ac.uk, or Prof. Nikos Ntoumanis on [redacted] or at N.Ntoumanis@bham.ac.uk.

Consent form

Motivation and Goal Striving Study

Consent Form

Investigators

Laura Healy
Prof. Nikos Ntoumanis
Dr. Jet Veldhuijzen van Zanten

I have read the above information and I am willing to take part in this investigation. I am aware that if I have any queries about the investigation I can contact Laura Healy or Prof. Nikos Ntoumanis using the contact details provided above. I understand that I am free to withdraw at any time up until the data is analysed without having to give an explanation.

Full Name (please print clearly) ……

Signed …….

Witnessed ……

Date ……..

Name: .....
Address: .....
.....
.....
Phone: .....
Email: .....

Time 1 Questionnaires

In the following questionnaires, you will be asked to rate items relating to your current coach, your goals for this season and your well-being. Please read the questions clearly and response honestly to each item.

What is your date of birth? .....

Are you: ☐ Male ☐ Female

What sport do you play? .....

What is your current club? .....

What team do you current play with? .....

How long have you been playing with this club? .....years .....months

How long have you been coached by your current coach?.....years .....months

How many hours per week do you train with this coach? .....hours per week

What is your primary playing position with this team? .....

Section 1

The following items are related to your experience with your coach. Coaches have different styles in dealing with athletes, and we would like to know more about how you have felt about your encounters with your coach. Your responses are confidential. Please answer the items honestly.

	Strongly Disagree			**Neutral**			**Strongly Agree**
I feel that my coach provides me choices and options.	1	2	3	4	5	6	7
My coach tries to motivate me by promising to reward me if I do well.	1	2	3	4	5	6	7
I feel understood by my coach.	1	2	3	4	5	6	7
My coach is less friendly with me if I don't make the effort to see things his/her way.	1	2	3	4	5	6	7
I am able to be open with my coach while engaged in my sport.	1	2	3	4	5	6	7
My coach shouts at me in front of others to make me do certain things.	1	2	3	4	5	6	7
My coach conveys confidence in my ability to do well in my sport.	1	2	3	4	5	6	7
My coach expects my whole life to centre on my sport participation.	1	2	3	4	5	6	7
I feel that my coach accepts me.	1	2	3	4	5	6	7

My coach only rewards/praises me to make me train harder.	1	2	3	4	5	6	7
My coach makes sure I really understand my goals in my sport and what I need to do.	1	2	3	4	5	6	7
My coach is less supportive of me when I am not training and competing well.	1	2	3	4	5	6	7
My coach encourages me to ask questions.	1	2	3	4	5	6	7
My coach threatens to punish me to keep me in line during training.	1	2	3	4	5	6	7
I feel a lot of trust in my coach.	1	2	3	4	5	6	7
My coach tries to control what I do during my free time.	1	2	3	4	5	6	7
My coach answers my questions fully and carefully.	1	2	3	4	5	6	7
My coach only uses rewards/praise so that I stay focused on tasks during training.	1	2	3	4	5	6	7
My coach listens to how I would like to do things.	1	2	3	4	5	6	7
My coach pays me less attention if I have displeased him/her.	1	2	3	4	5	6	7
My coach handles people's emotions very well.	1	2	3	4	5	6	7
My coach intimidates me into doing the things that he/she wants me to do.	1	2	3	4	5	6	7
I feel that my coach cares about me as a person.	1	2	3	4	5	6	7
My coach tries to interfere in aspects of my life outside my sport.	1	2	3	4	5	6	7
I don't feel very good about the way my coach talks to me.	1	2	3	4	5	6	7
My coach only uses rewards/praise so that I complete all the tasks he/she sets in training.	1	2	3	4	5	6	7
My coach tries to understand how I see things before suggesting a new way to do things.	1	2	3	4	5	6	7
My coach is less accepting of me if I have disappointed him/her.	1	2	3	4	5	6	7
I feel able to share my feelings with my coach.	1	2	3	4	5	6	7
My coach embarrasses me in front of others if I do not do the things he/she wants me to do.	1	2	3	4	5	6	7

Below are some sentences that describe personal feelings or experiences athletes might have in their sport. Please indicate how true each of the phrases are to you. There are no right or wrong answers, so do not spend too much time on any single question. Please answer the questions honestly.

In my sport.....	Not true at all			Somewhat true			Very true
I feel close to other people.	1	2	3	4	5	6	7
I feel prevented from making choices with regard to the way I train.	1	2	3	4	5	6	7
I feel I am pursuing goals that are my own.	1	2	3	4	5	6	7
Situations occur in which I am made to feel incapable.	1	2	3	4	5	6	7
I feel I participate willingly.	1	2	3	4	5	6	7
I feel I am rejected by those around me.	1	2	3	4	5	6	7
I get opportunities to make choices.	1	2	3	4	5	6	7
I feel that I am being forced to do things that I don't want to.	1	2	3	4	5	6	7
I feel pushed to behave in certain ways.	1	2	3	4	5	6	7
I can overcome challenges.	1	2	3	4	5	6	7
There are times where I am made to feel incompetent.	1	2	3	4	5	6	7
I show concern for others.	1	2	3	4	5	6	7
I feel others can be dismissive of me.	1	2	3	4	5	6	7
I choose to participate according to my own free will.	1	2	3	4	5	6	7
I feel forced to follow training decisions made for me.	1	2	3	4	5	6	7
I have a say in how things are done.	1	2	3	4	5	6	7
There are people who care about me.	1	2	3	4	5	6	7
There are situations where I am made to feel inadequate.	1	2	3	4	5	6	7
I am skilled at my sport.	1	2	3	4	5	6	7
I feel I am good at my sport.	1	2	3	4	5	6	7

I feel other people dislike me.	1	2	3	4	5	6	7
I can take part in the decision making process.	1	2	3	4	5	6	7
I get opportunities to feel that I am good at my sport.	1	2	3	4	5	6	7
I feel under pressure to agree with the training regimen I am provided.	1	2	3	4	5	6	7
I really have a sense of wanting to be there.	1	2	3	4	5	6	7
I feel I am doing what I want to be doing.	1	2	3	4	5	6	7
I feel inadequate because I am not given opportunities to fulfil my potential.	1	2	3	4	5	6	7
I have the ability to perform well.	1	2	3	4	5	6	7
There are people who I can trust.	1	2	3	4	5	6	7
I feel other people are envious when I achieve success.	1	2	3	4	5	6	7
I have close relationships with people.	1	2	3	4	5	6	7
I get opportunities to make decisions.	1	2	3	4	5	6	7

Section 2

In this section, try to think of your most important sporting goal, that you will strive for from the start of the current season, and that you hope to make progress in during the season. For the purpose of this questionnaire, goals are considered to be objectives you are typically trying to attain in your main sport. When considering your goal, please try to think of a goal where the outcome is based upon your progress (e.g. improving a particular skill) rather than a goal which may be influenced by opponents (e.g. winning the league).

WRITE YOUR GOAL HERE: …….....

Answer the following questions thinking of this goal.

Rate the extent to which you will be pursuing this goal for each of the following 4 reasons:	**Not at all**			**Neutral**			**Very much so**
Because someone else wants you to.	1	2	3	4	5	6	7
Because you would feel ashamed, guilty, or anxious if you didn't.	1	2	3	4	5	6	7
Because you personally believe it's an important goal to have.	1	2	3	4	5	6	7
Because of the fun and enjoyment the goal provides you.	1	2	3	4	5	6	7
In pursuit of this goal...	**Not at all**			**Neutral**			**Very much so**
How hard will it be for you to achieve this goal during the season?	1	2	3	4	5	6	7
Rate how challenging this goal is for you:	1	2	3	4	5	6	7
How difficult is this goal?	1	2	3	4	5	6	7
In pursuit of this goal...	**None or not very much**			**Some**			**Maximum or very high**
How much effort do you intend to devote towards this goal during the current season?	1	2	3	4	5	6	7
Rate the amount of effort you are intending to put into this goal during the current season:	1	2	3	4	5	6	7
Rate how hard you are intending to try in pursuing this goal during the current season:	1	2	3	4	5	6	7

Section 3

Please respond to each of the following statements by indicating the degree to which the statement is true for you in general in your life.

In general....	**Not at all true**			**Somewhat true**			**Very true**
I feel alive and vital.	1	2	3	4	5	6	7
I don't feel very energetic.	1	2	3	4	5	6	7
Sometimes I feel so alive I just want to burst.	1	2	3	4	5	6	7
I have energy and spirit.	1	2	3	4	5	6	7
I look forward to each new day.	1	2	3	4	5	6	7
I nearly always feel alert and awake.	1	2	3	4	5	6	7
I feel energised.	1	2	3	4	5	6	7

*The following questions relate to how you have felt **about your sport, in the past month.***

	Almost never	**Rarely**	**Sometimes**	**Frequently**	**Almost always**
I'm accomplishing many worthwhile things in my sport.	1	2	3	4	5
I feel so tired from my training that I have trouble finding energy to do others things.	1	2	3	4	5
The effort I spend in my sport would be better spent doing other things.	1	2	3	4	5
I feel overly tired from my sport participation.	1	2	3	4	5
I don't feel confident about my sport ability.	1	2	3	4	5
I don't care as much about my sport performance as I used to.	1	2	3	4	5
I am not performing up to my ability in my sport.	1	2	3	4	5
I feel "wiped out" from my sport.	1	2	3	4	5
I'm not into my sport like I used to be.	1	2	3	4	5
I feel physically worn out from my sport.	1	2	3	4	5
I feel less concerned about being successful in my sport than I used to.	1	2	3	4	5
I am exhausted by the mental and physical demands of my sport.	1	2	3	4	5
It seems that no matter what I do, I don't play as well as I should.	1	2	3	4	5

I feel successful at my sport.	1	2	3	4	5
I wonder if my sport is worth all the time and energy I put into it.	1	2	3	4	5

The following questions relate to physical symptoms you may have felt over the past week. Please rate the extent to which you have felt each symptom.

In the past week I have experienced...	**Not at all**						**All the time**
Headache	1	2	3	4	5	6	7
Stomach-ache/pain	1	2	3	4	5	6	7
Chest/heart pain	1	2	3	4	5	6	7
Runny or congested nose	1	2	3	4	5	6	7
Coughing/sore throat	1	2	3	4	5	6	7
Faintness/dizziness	1	2	3	4	5	6	7
Shortness of breath	1	2	3	4	5	6	7
Acne/pimples	1	2	3	4	5	6	7
Stiff/sore muscles	1	2	3	4	5	6	7
Other	1	2	3	4	5	6	7

Time 2 Questionnaires

In the following questionnaires, you will be asked to rate items relating to your goals for this season and your well-being. Please read the questions clearly and response honestly to each item.

What is your date of birth? .....

Are you: ☐ Male ☐ Female

What sport do you play? .....

What is your current club? .....

What team do you current play with? .....

How long have you been playing with this club? .....years .....months

How long have you been coached by your current coach?.....years .....months

How many hours per week do you train with this coach? .....hours per week

What is your primary playing position with this team? .....

Section 1

At the beginning of the season you identified that your goal was:

.....

The following questions relate to the goal you identified at the beginning of the season.

Rate the extent to which you were pursuing this goal for each of the following 4 reasons:	**Not at all**			**Neutral**			**Very much so**
Because someone else wanted you to.	1	2	3	4	5	6	7
Because you would have felt ashamed, guilty, or anxious if you didn't.	1	2	3	4	5	6	7
Because you personally believed it was an important goal to have.	1	2	3	4	5	6	7
Because of the fun and enjoyment the goal provided you.	1	2	3	4	5	6	7

The following questions relate towards your progress towards this goal over the competitive season.

	Not at all			**Neutral**			**Very much so**
To what extent do you feel you have attained your goal?	1	2	3	4	5	6	7

Section 2

Have you stopped working towards this goal?

☐ **No** (please go to Section 3)

☐ **Yes**

When did you stop working towards this goal?

.....
.....
.....
.....

Why did you choose to stop working towards this goal?

.....
.....
.....
.....

Section 3

Please respond to each of the following statements by indicating the degree to which the statement is true for you in general in your life.

In general...	**Not at all true**			**Somewhat true**			**Very true**
I feel alive and vital.	1	2	3	4	5	6	7
I don't feel very energetic.	1	2	3	4	5	6	7
Sometimes I feel so alive I just want to burst.	1	2	3	4	5	6	7
I have energy and spirit.	1	2	3	4	5	6	7
I look forward to each new day.	1	2	3	4	5	6	7
I nearly always feel alert and awake.	1	2	3	4	5	6	7
I feel energised.	1	2	3	4	5	6	7

*The following questions relate to how you have felt **about your sport, in the past month.***

	Almost never	**Rarely**	**Sometimes**	**Frequently**	**Almost always**
I'm accomplishing many worthwhile things in my sport.	1	2	3	4	5
I feel so tired from my training that I have trouble finding energy to do others things.	1	2	3	4	5
The effort I spend in my sport would be better spent doing other things.	1	2	3	4	5
I feel overly tired from my sport participation.	1	2	3	4	5
I don't feel confident about my sporting ability.	1	2	3	4	5
I don't care as much about my sport performance as I used to.	1	2	3	4	5
I am not performing up to my ability in my sport.	1	2	3	4	5
I feel "wiped out" from my sport.	1	2	3	4	5
I'm not into my sport like I used to be.	1	2	3	4	5
I feel physically worn out from my sport.	1	2	3	4	5
I feel less concerned about being successful in my sport than I used to.	1	2	3	4	5
I am exhausted by the mental and physical demands of my sport.	1	2	3	4	5
It seems that no matter what I do, I don't play as well as I should.	1	2	3	4	5

I feel successful at my sport.	1	2	3	4	5
I wonder if my sport is worth all the time and energy I put into it.	1	2	3	4	5

The following questions relate to physical symptoms you may have felt over the past week. Please rate the extent to which you have felt each symptom.

In the past week I have experienced...	**Not at all**						**All the time**
Headache	1	2	3	4	5	6	7
Stomach-ache/pain	1	2	3	4	5	6	7
Chest/heart pain	1	2	3	4	5	6	7
Runny or congested nose	1	2	3	4	5	6	7
Coughing/sore throat	1	2	3	4	5	6	7
Faintness/dizziness	1	2	3	4	5	6	7
Shortness of breath	1	2	3	4	5	6	7
Acne/pimples	1	2	3	4	5	6	7
Stiff/sore muscles	1	2	3	4	5	6	7
Other	1	2	3	4	5	6	7

Appendix 4: Chapter 5 materials

Participant Information Sheet

Goal management in University Scholarship athletes

Information Sheet

Thank you for considering participation in this project, which has been approved by the University of Birmingham's Science, Technology, Engineering and Mathematics Ethical Review Committee and Newman University. The aim of this project is to investigate motivation in situations where individuals are pursing goals in several different areas. We are primarily interested in the interaction between motivation for a student athlete's academic and sporting goals, and the impact on goal management and well-being. **To be eligible to participate in this study, you should be currently registered as a student at a UK university and also represent your university in British University and College Sport (BUCS) competitions. We are interested in hearing from both team and individual athletes.**

If you agree to participate in this study you will complete one questionnaire which will be completed online. The questionnaires will include questions relating to your goals for the academic year, your motivation for these goals, your coach, your responses to challenges when trying to reach your goals, as well as your physical and psychological well-being. The questionnaire has six sections which should take around 20 minutes to complete.

Your name, or any other personal information, will not on any of the questionnaires. None of your responses will be shared with your coach, teammates, academic tutors, or anyone else except the researchers conducting this investigation. Participation in the study will have no impact on your place on your academic course. Consequently, we would be grateful if you were honest in your responses. All data will be kept for a period of ten years. Please note, your participation in this study is voluntary and you may withdraw at any time without explanation, up until the 1st April 2015, after which the data will been analysed.

If you have any queries regarding any aspect of this study please contact Laura Healy on [redacted] or at lch147@bham.ac.uk .

Consent Form

Goal management in University Scholarship athletes

Consent Form

Investigators
Laura Healy
Prof. Nikos Ntoumanis

I have read the above information and I am willing to take part in this investigation. I am aware that if I have any queries about the investigation I can contact Laura Healy using the contact details provided above. I understand that I am free to withdraw at any time up until the data is analysed without having to give an explanation.

Full Name (please print clearly) ……

Signed …….

Date ……..

If you would like to receive a copy of the results then please leave your email address below.

Email: .....

Questionnaires

Goal management in university scholarship athletes

This research is exploring the goals that university athletes may be pursing in sport and their studies. We are interested in the relations between the different goals that you may have, and how these may be associated with performance in sport and academia, and your well-being. Through this research, we are hoping to understand how university athletes can be most effective when trying to achieve goals in several domains. All the answers you provide will be confidential. There are no right or wrong answers, and please take the time to answer honestly to all of the questions.

Are you (please circle)? Male Female

What is your age in years and months? .....years .....months

What is your main sport? .....

How long have you been playing this sport? .....years .....months

What degree are you studying for (please provide level and subject e.g. BSc Sports Science?

.....

What year of study are you currently in? .....

Do you receive a scholarship for your studies as a result of your sport (please circle)?

Yes No

What is your current highest competitive level? .....

Section 1

*This section is concerned with your most important goal in your main sport (which you indicated above). Think of **your most important goal in your main sport**, that you set at **the beginning of the academic year**, and that you hoped to make progress on during this time. For the purpose of the following questions, goals are considered to be objectives you are typically trying to attain in your main sport. We want you to think of your main **performance** goal, for example, obtaining a PB in a national competition.*

WRITE YOUR MAIN SPORTING PERFORMANCE GOAL HERE:

……

We are interested in the reasons why you are trying to achieve this goal. When answering the following questions, try to think of how you felt when you first set this goal at the beginning of the academic year.

Rate the extent to which you are pursuing this goal for each of the following 4 reasons:	**Not at all**			**Somewhat**			**Very much so**
Because someone else wants you to.	1	2	3	4	5	6	7
Because you would feel ashamed, guilty, or anxious if you didn't.	1	2	3	4	5	6	7
Because you personally believe it's an important goal to have.	1	2	3	4	5	6	7
Because of the fun and enjoyment the goal provides you.	1	2	3	4	5	6	7

Section 2

*This section is concerned with your most important goal in your academic studies. Think of **your most important goal in your studies**, that you set at **the beginning of the academic year,** and that you hoped to make progress on during this time. For the purpose of the following questions, goals are considered to be objectives you are typically trying to attain in your main sport. We want you to think of your main **academic** goal, for example obtaining a 2:1 grade in all modules.*

WRITE YOUR MAIN ACADEMIC GOAL HERE:

……

We are interested in the reasons why you are trying to achieve this goal. When answering the following questions, try to think of how you felt when you first set this goal at the beginning of the academic year.

Rate the extent to which you are pursuing this goal for each of the following <u>4</u> reasons:	**Not at all**			**Somewhat**			**Very much so**
Because someone else wants you to.	1	2	3	4	5	6	7
Because you would feel ashamed, guilty, or anxious if you didn't.	1	2	3	4	5	6	7
Because you personally believe it's an important goal to have.	1	2	3	4	5	6	7
Because of the fun and enjoyment the goal provides you.	1	2	3	4	5	6	7

Section 3

*The following questions are about the relationships between your sport and academic goals. We are interested in how pursuing your academic goal impacts upon trying to achieve your sporting goal, and vice versa. Based on your experiences over **<u>the past month</u>**, please think about how striving for one goal impacts your pursuit of the other. Please answer carefully for both goals regarding the impact of the other goal.*

<u>Sporting goal</u>

In the past month…..	**Never or rarely**		**Sometimes**		**Very often**
How often has it happened that, because of the pursuit of your **<u>academic</u>** goal, you could not invest as much **<u>time</u>** into your **<u>sporting</u>** goal as you would have liked to?	1	2	3	4	5
How often has it happened that, because of the pursuit of your **<u>academic</u>** goal, you could not invest as much **<u>money</u>** into your **<u>sporting</u>** goal as you would have liked to?	1	2	3	4	5
How often has it happened that, because of the pursuit of your **<u>academic</u>** goal, you could not invest as much **<u>effort</u>** into your **<u>sporting</u>** goal as you would have liked to?	1	2	3	4	5
How often has it happened that you did something in the pursuit of your **<u>academic</u>** goal that was incompatible with your **<u>sporting</u>** goal?	1	2	3	4	5

How often has it happened that you did something in the pursuit of your **academic** goal that was simultaneously beneficial for your **sporting** goal?	1	2	3	4	5
The pursuit of my **academic** goal sets the stage for the realisation of my **sporting** goal.	1	2	3	4	5

Academic goal

In the past month…..	**Never or rarely**		**Sometimes**		**Very often**
How often has it happened that, because of the pursuit of your **sporting** goal, you could not invest as much **time** into your **academic** goal as you would have liked to?	1	2	3	4	5
How often has it happened that, because of the pursuit of your **sporting** goal, you could not invest as much **money** into your **academic** goal as you would have liked to?	1	2	3	4	5
How often has it happen that, because of the pursuit of your **sporting** goal, you could not invest as much **effort** into your **academic** goal as you would have liked to?	1	2	3	4	5
How often has it happened that you did something in the pursuit of your **sporting** goal that was incompatible with your **academic** goal?	1	2	3	4	5
How often has it happened that you did something in the pursuit of your **sporting** goal that was simultaneously beneficial for your **academic** goal?	1	2	3	4	5
The pursuit of my **sporting** goal sets the stage for the realisation of my **academic** goal.	1	2	3	4	5

Thank you for taking the time to complete this survey. If you would like to know the findings of the study once the data has been analysed, please contact Laura Healy (contact details on information sheet).

Thanks again for your time and for helping with this important research.