

Effects of a Mastery Intervention Programme on the Motivational Climate and Achievement Goals in Sport Coaching: A Pilot Study

Mohamad Faithal Haji Hassan¹ and Kevin Morgan²

¹University of Malaya, Kuala Lumpur, Malaysia

²School of Sport, Cardiff Metropolitan University, Cyncoed Campus, Cyncoed Road, Cardiff, UK, CF23 6XD

E-mail: kmorgan@cardiffmet.ac.uk

ABSTRACT

The task, authority, recognition, grouping, evaluation, and time structures (TARGET) have been identified as influential in determining a mastery motivational climate. To date, there is relatively little research on the use of TARGET based interventions in the sport setting. The purpose of this study was to examine the effects of a mastery intervention programme on sport coaches' TARGET behaviours and athlete's perceptions of the motivational climate and achievement goal orientations. Study participants included four coaches and 43 of their athletes from a young adult sport population, representing a range of different sports. A multi-methods approach was used in the examination of the link between coaching behaviours and athletes' psychosocial responses. Coaches' behaviours were assessed at three time points (pre, mid, and post-intervention), and athletes' self-perceptions were measured at two time points (pre and post-intervention). For coach observations, the percentage 'mastery', 'ego' and 'neither' TARGET behaviours were calculated for each of the three filmed coaching sessions. Wilcoxon tests were conducted in order to measure the differences between athletes' pre- and post-intervention perceptions of the motivational climate, and goal orientations. Results revealed increased mastery coaching behaviours and significant increases in athlete's perceptions of a mastery climate and task goal orientations and a significant decrease in ego perceptions of the climate and ego goal orientations. Given the adaptive motivational responses that are associated with a mastery climate and mastery goal orientations, this intervention has important implications for sport coaching.

Key words: Achievement Goal Theory, Mastery Approach to Coaching, Motivation

INTRODUCTION

Within the sport environment, coaches strongly influence the nature and quality of the sport experience through the goals they promote, the attitudes and values they transmit, and the nature of their interactions with the athletes [1]. Achievement goal theory (AGT) indicates that coaching behaviours can have important effects on how athletes define success and on a range of motivational factors [2, 3]. According to AGT, two conceptions of ability operate in achievement contexts, embedded within two distinct achievement goals, namely task and ego [2]. When individuals are task involved, they evaluate competence using self-referenced criteria and feel successful when they learn something new, master a task, or improve their skills. In contrast, when individuals are ego involved, they evaluate competence using other-referenced criteria and feel successful when they establish superiority over others [2]. According to the theory, individuals have a proneness to the two types of involvement known as task and ego orientation [2]. These two orientations have been found to be relatively orthogonal so that individuals can be high or low on either or both goals [4]. While much of the research into AGT has focused on individual differences in these dispositional goal orientations and associated patterns of cognition and affect [2, 5-7], some has considered how the structure and demands of the learning environment (referred to as the motivational climate) can evoke different achievement goals and motivational patterns [8-10].

Ames [9] described a mastery climate as one in which teachers or coaches define success in terms of self-improvement, task mastery, and exhibiting maximum effort and persistence. In such a climate, athletes are reinforced for selecting challenging tasks, giving maximum effort, persisting in the face of setbacks, encouraging and supporting teammates, and demonstrating personal improvement. Furthermore, mistakes are viewed as a potentially valuable source of feedback that can facilitate improvement. In contrast, an ego-involving climate promotes social comparison as the basis for success. When coaches create an ego climate, they emphasise winning and tend to give differential attention and focus positive reinforcement on athletes who are most competent and instrumental to winning. Skill development is in the service of beating others rather than personal improvement, and mistakes may evoke punitive behaviours from the coach [11, 12].

In physical education (PE) and youth sport settings, adaptive learning and motivational patterns such as a positive attitude towards the activity, feelings of satisfaction, high perceptions of ability, the choice of challenging tasks, high intrinsic motivation, and placing a high value on effort and the process of learning have been consistently associated with perceptions of a mastery climate [e.g., 13-15]. In contrast, a perceived ego climate has been linked to less adaptive cognitive and affective responses, such as boredom, beliefs that ability rather than effort leads to success, a lack of enjoyment, and a negative attitude toward the subject matter [e.g. 13, 15].

Based on the work of Epstein [16], Ames [9] identified the task, authority, recognition, grouping, evaluation, and time structures (TARGET) as influential in determining mastery or ego climates in achievement situations. According to Ames, to foster a mastery climate the task structure should involve: a) students in setting their own personal goals focused on self-referenced improvement, b) multiple activities in order to reduce the opportunity for normative comparisons of ability, and c) tasks which are differentiated to optimally challenge all students. The authority structure should encourage students to be involved in decision making and leadership roles. Recognition and evaluation from the teacher should be given privately and be individually based on effort and progress; further, students should be involved in self-evaluation against personal goals. Students should be grouped into small mixed ability and cooperative groups and be given the opportunity to change groups both within and between

sessions. Finally, the time structure should allow flexible time for improvement and maximise time to practice and learn. In contrast, an ego climate would emphasise uni-dimensional competitive tasks, teacher/coach authority, normatively based public recognition and evaluation, homogenous ability groups, and time to practice would be inflexible.

Smith and colleagues [1, 17] implemented a mastery approach for coaches (MAC) in youth sport settings and found compelling evidence for the effectiveness of the interventions. Specifically, they found that athletes who experienced the MAC interventions perceived their coaches as being more mastery involving and experienced an increase in task goal orientations, a decrease in ego goal orientations and a decrease in sport anxiety in comparison to athletes in non-intervention control conditions. While the MAC intervention “behavioural guidelines are consistent with the procedures designed by Ames [9] and Epstein [16] to create a mastery learning climate” [1, p 47], they were not specifically or exclusively focused on the TARGET structures.

Intervention studies specifically manipulating the TARGET structures to create a mastery climate in Physical Education (PE) lessons have resulted in higher levels of perceived competence, satisfaction and enjoyment, less boredom, a stronger preference for engaging in more challenging tasks, higher mastery goal orientation and a stronger belief that success was the result of effort [18-20]. In contrast, when the TARGET structures were more ego-involving, students’ tended to be more ego oriented; had lower levels of perceived ability, satisfaction and enjoyment; were less interested in achievement tasks; and believed success was the result of ability and deception.

In order to further develop this line of research, Morgan et al. [21] used the Behavioural Evaluation Strategies and Taxonomies (BEST) software [22] to create a computer-based observational measure of the TARGET structures in PE, which allows researchers to film lessons and code the teacher’s behaviours as ‘mastery’, ‘ego’ or ‘neither’. This addresses the suggestion by Smith et al. [1] that motivational climate should be measured using a multi-method approach involving both athlete perceptions and observational methods. Furthermore, this approach responds to Langan et al.’s [23] concerns that a major stumbling block in the advancement of coach education literature is the lack of a theoretical basis for many interventions and their suggestion that future coach education interventions might be more effective, if they were explicitly based on a theoretical framework. To date, the TARGET behavioural measure [21] has not been used in a sport coaching context.

Based on self-observation and analysis of filmed lessons, using the behavioural TARGET measure [21], Morgan and Kingston [24] developed a mastery intervention programme for PE teachers. Results revealed that the programme was successful in fostering more mastery involving teaching behaviours and higher perceptions of mastery involving TARGET behaviours. However, a limitation was the short duration of the intervention involving only one meeting with each of the teachers to reflect on their TARGET behaviours and suggest mastery focused modifications to their future practice. The present study aimed to extend this line of research into sport coaching and to increase the duration of the intervention and the number of meetings with the practitioners to reflect on their TARGET behaviours.

Given the critical role that coaching behaviours can have on the motivational climate and the subsequent responses of athletes, the potential value of educational interventions designed to train coaches to foster a mastery climate seems self-evident. The purpose of this pilot study, therefore, was to develop a mastery intervention programme in order to modify coaches’ behaviours to optimize the motivational climate in a performance coaching environment and to evaluate the impact of this programme on athletes’ perceptions of the motivational climate and their achievement goal orientations.

METHOD

PARTICIPANTS

The participants were four sport coaches (2 males, 2 females) from a variety of sports (track and field athletics, women's soccer, netball, and trampolining) and their entire coaching groups of 43 athletes (track and field, $n = 6$; women's soccer, $n = 22$; netball, $n = 11$; and trampolining, $n = 4$) from a university in South Wales, UK. The coaches were individually invited and their athletes agreed to participate in the study. The coaches were all involved in university sport at the time of the study with a mean coaching experience of six years and a minimum of three years. The athletes had a mean age of 19.53 years ($SD=1.42$) and were involved in performance sport ranging from club to national representation. They had been participating in sport from 5 to 16 years with the mean involvement of 3.14 years ($SD=0.16$). All athletes were in their competitive seasons at the time of the study, except for the track and field athletes who were in their pre-season phase of training.

STUDY DESIGN

The study design was a within-subjects experimental design that was conducted over a five-month period. The four coaches were exposed to a mastery intervention that was based on the TARGET structures [9]. The coaching sessions were conducted in the University sporting venues, including an indoor athletics centre, a gymnasium, an astro-turf pitch, and a sports hall. Each of the coaching sessions was between 60 and 90 minutes duration. The effectiveness of this intervention was assessed by measuring coaches' TARGET-related behaviours at three observational timepoints (pre-intervention, mid-intervention, and post-intervention) and by assessing athletes' perceptions of their team's motivational climate and their achievement goal orientations at pre- and post-intervention.

MEASURES

TARGET Observational Measure

TARGET coding categories associated with the coaches' behaviours were based on previous research by Morgan et al. [21] (see Table 1). SportsCode Version 7.5.6 software was used to analyse the coaches' TARGET behaviours from video. This software is user friendly and highly sophisticated allowing for in-depth performance analysis of behaviours in a variety of situations and settings (Sportstec.com, 2008). The software enables the user to define a set of behaviours (e.g. TARGET coaching behaviours) and to capture the frequency and duration of these behaviours by using a simple interface whilst viewing the video on the computer screen [25]. This allowed the researcher to examine the statistical evidence to give a complete frequency and duration analysis of the TARGET behaviours. In addition, the researcher was able to show relevant video clips to illustrate to the coaches any important points for discussion.

Intra-observer reliability of the video analysis was determined through a test-retest viewing, and repeated analysis of one of the sessions. The intra-observer reliability test resulted in a 98% agreement on the data from the software by the researcher over three attempts over a period of two weeks. For the inter-observer agreement and reliability, Kappa (κ) [27] coefficient was used to compare the degree of consensus between different observers. The value of Kappa is between 0 and 1 with a κ value of 0.8 and above representing a strong strength of agreement [26, 27]. For this study, a strong inter-observer agreement of $\kappa = 0.93$ was established between the researcher and an expert in motivational climate and sport coaching.

Table 1. TARGET motivational climate coding system template (adapted from Morgan et al. [21])

	Mastery	Neither	Ego
▲ TASK (variety of activities, athlete active involvement individual challenge, realistic and performance goals)	Self/Group Referenced Goal		Competitive Goal
	Multi-Dimensional	No Clear Goal Warm-Up	Uni-Dimensional
	Differentiated		Undifferentiated
▲ AUTHORITY (leadership roles, athletes decision making, self-monitoring and management)	Athlete Decision (athlete autonomy)		Coach Decision
▲ RECOGNITION (recognise athletes individual progress, effort and improvement, equal to get rewards and acknowledgement)	Private Self-Referenced (done privately)	General Luck (focused on the whole team; focus on luck)	Public Normative (comparing to other athlete)
▲ GROUPING (heterogeneous, flexible and multiple grouping arrangements)	Small Mixed Group (athletes keep changing in grouping)		Ability Group (similar ability grouping) Large Group
▲ EVALUATION (focused on individual effort, improvement and progress, private and self-evaluation)	Private Feedback (private evaluation & feedback)	General Feedback (directed to the whole team)	Public Feedback (compared to others)
▲ TIMING (flexible time for improvement and learning, athletes dictate time)	Flexible Time (flexible time to practise)	Inactive Time (no activity)	Inflexible Time (coach dictate time)

Perceived Motivational Climate in Sport Questionnaire-2 (PMCSQ-2)

The PMCSQ-2 [28] was used pre- and post-intervention to measure the athletes' perceptions of the motivational climate created by the coaches during the coaching sessions. The mastery sub-scales consisted of seven items on *Cooperative Learning* (e.g., participants help each other learn), four items on *Importance Role* (e.g., each player has an important role), and four items focused on *Improvement* (e.g., the focus is to improve each game/practice). The ego sub-scales included five items on *Punishment for Mistake* (e.g., participants are afraid of making mistakes), six items on *Unequal Recognition* (e.g., the coach has his/her favourite), and three items on *Intra-team Rivalry* (e.g., participants are encouraged to outplay their own teammates).

Perceptions of Success Questionnaire (POSQ)

The POSQ [29] was used pre- and post-intervention to measure athlete's goal orientations by assessing six task items (e.g., *I work hard*) and six ego items (e.g., *I beat other people*).

INTERVENTION

The intervention involved observation and analysis from the video footage by the researcher, and a reflective discussion session (lasting approximately 60 minutes) between the researcher and coaches after each of the three filmed coaching sessions. During the reflective discussion sessions selected clips from the video analysis were used in order to highlight the TARGET behaviours and to modify coach behaviours to be more mastery focused in future sessions. Each of the TARGET structures was systematically considered with the focus being on identifying aspects of the coach behaviours that could be more mastery focused. For example, if the coach was providing comparative (ego-involving) recognition to the athletes, the researcher would discuss the motivational climate that this was likely to be promoting, with reference to the theory, and a reflective discussion would ensue between researcher and coach. During this discussion the researcher would guide the coach towards providing more mastery involving self-referenced recognition based on effort and individual progress during subsequent sessions. The guidance in these discussions was supported by theory and previous research, thus creating a strong rationale for the suggested change in coach behaviours. If the coaches disagreed with the suggested modifications to their behaviours they were still encouraged to make the changes in the following sessions and to reflect on this in the next reflective discussion meeting. The whole intervention was designed to promote reflective practice and to enhance the coaches' ability to be open minded and self critical about their own coaching.

DATA ANALYSIS

Data analysis was conducted in three stages (pre, mid and post-intervention) for the coach TARGET behaviours and two stages (pre and post-intervention) for the athlete questionnaire responses (perceptions of the motivational climate and goal orientations). For coach observations, consistent with the work of Morgan et al. [21], the percentage 'mastery', 'ego' and 'neither' TARGET behaviours were calculated for each of the three filmed coaching sessions, for each coach. Wilcoxon tests for non-parametric data [30] were conducted in order to measure the differences between athletes' pre- and post-intervention perceptions of the motivational climate, and goal orientations.

RESULTS**OBSERVATIONAL DATA***Task structure*

Assessment of the coaches' behaviours during the pre-intervention phase revealed that a combination of mastery and ego involving coach behaviours existed in the task structure with some coaches scoring high percentages of an ego climate. For example, for Coach 4 (athletics) all of the tasks (100%) were uni-dimensional and un-differentiated and therefore classified as ego involving (see Table 2). Coach 3 (trampolining) also scored a high percentage of uni-dimensional (69.7%) and un-differentiated tasks (69.9%), and Coach 2 (women's football) was high in uni-dimensional tasks (58.6%). Additionally, Coach 4 and Coach 2 scored 10.4% and 2.1% respectively for setting competitive (ego) goals for the tasks. On the other hand, most of the coaches also scored high in mastery tasks. For example,

Table 2: Coaches' task behavioural changes (%)

	Task	Pre	Mid	Post
Coach 1 Netball	Self- referenced	72.8	83.3	95.2
	Warm-up	4.7	11.0	3.0
	No Clear Goal	22.5	5.7	1.8
	Competitive	0.0	0.0	0.0
	Multi-dimensional	58.0	46.4	88.0
	Uni-dimensional	42.0	53.6	12.0
	Differentiated	58.4	46.4	86.5
	Undifferentiated	41.6	53.6	13.5
Coach 2 Women's Soccer	Self- referenced	80.4	73.7	90.2
	Warm-up	17.5	21.2	7.3
	No Clear Goal	0.0	5.1	2.5
	Competitive	2.1	0.0	0.0
	Multi-dimensional	41.4	76.4	78.8
	Uni-dimensional	58.6	23.6	21.2
	Differentiated	75.0	100.0	78.8
	Undifferentiated	25.0	0.0	15.0
Coach 3 Trampolining	Self- referenced	91.0	90.4	98.5
	Warm-up	6.2	3.3	1.2
	No Clear Goal	2.9	6.4	0.3
	Competitive	0.0	0.0	0.0
	Multi-dimensional	30.3	85.0	100.0
	Uni-dimensional	69.7	15.0	0.0
	Differentiated	30.3	85.0	100.0
	Undifferentiated	69.7	15.0	0.0
Coach 4 Track & Field	Self- referenced	68.1	73.9	77.2
	Warm-up	21.5	11.4	22.1
	No Clear Goal	0.0	11.2	0.7
	Competitive	10.4	3.5	0.0
	Multi-dimensional	0.0	18.6	52.3
	Uni-dimensional	100.0	81.4	47.7
	Differentiated	0.0	0.0	52.3
	Undifferentiated	100.0	100.0	47.7

Coaches 1 (netball), 2 (football) and 3 (trampolining) scored high in setting self-referenced goals with the score of 72.8%, 80.4%, and 91.0% respectively. Coach 1 and 2 also scored high in task differentiation with a score of 58% and 75% respectively.

There were mixed reactions to the manipulating of mastery TARGET structures from coaches in the mid-intervention phase. Some coaches responded well to the mastery structures, while others were trying to adapt to the changes. Generally, the coaches were adapting positively and making changes to the climate to become more mastery focused. Coach 1 and Coach 4 showed increases in self-referenced goals with the score of 83.3% and 73.9%, improved by 10.5% and 5.8% respectively, whereas there was a slight drop for Coach 2 (73.7%) and Coach 3 (90.4%), dropping by 6.7% and 0.6% respectively. All coaches scored low percentages of no clear goals (i.e., Coach 1 - 5.7%; Coach 2 - 5.1%; Coach 3 - 6.4; and Coach 4 - 11.2%) when they gave instructions or explanation to the athletes. Coach 4 still included a low percentage of competitive goals (3.5%), but this was a drop of 6.9% from the pre-intervention session. In the use of multi-dimensional tasks, except for Coach 1 who dropped 11.6% from the pre-intervention to 46.4%, all coaches scored higher (i.e., Coach 2 increased by 35%; Coach 3 by 54.7% and Coach 4 increased by 18.6%). Coaches 2 and 3 scored higher by 25% and 54.7% respectively in differentiated tasks increasing to 100% (Coach 2) and 85% (Coach 3). On the other hand, Coach 4 still conducted 100% of his session using undifferentiated tasks, while Coach 1 dropped to 46.4% from 58.4% in the pre-intervention phase.

In the final phase of the intervention, the percentage of behavioural changes by all coaches showed a great improvement in mastery focus. In the task structure, all coaches recorded a high percentage in setting self-referenced goals in their training compared to the previous two phases of the intervention (e.g., Coach 1 (95.2%), Coach 2 (90.2%), Coach 3 (98.5%), and Coach 4 (77.2%) increasing by 11.9% (Coach 1), 16.5% (Coach 2), 8.1% (Coach 3), and 4.3% (coach 4) compared to the mid-intervention phase (See Table 2). Subsequently, coaches were able to avoid setting ego involving competitive tasks in their sessions. Similar improvement was shown in multi-dimensional tasks, with all coaches improving the percentages; Coach 1 increased by 21.6% (to 88.0%), Coach 2 increased by 2.4% (to 78.8%), Coach 3 improved by 15% (to 100%), and Coach 4 improved by 33.7% (to 52.3%). Even though Coach 4 recorded 47.7% for uni-dimensional tasks, this coach managed to apply more multi-dimensional tasks compared to the previous two phases. The majority of coaches also applied more differentiated activities for their athletes, with only Coach 2 scoring 78.8% (a drop of 11.2% from the previous phase) while Coach 1, 2 and 3 made positive improvements to 86.5%, 100% and 52.3% respectively.

Authority

In the authority structure, Coaches 2, 3 and 4 scored high percentages of 55%, 69.9% and 72.6% respectively, in coach's decisions as opposed to athlete's decisions in the pre-intervention phase. Only Coach 1 scored a relatively high 55% by allowing athlete's decision making and responsibility in coaching sessions (see Table 3).

In the mid-intervention phase, most coaches scored higher on ego compared to the first phase of the intervention programme. Coaches 1, 2 and 4 made more coach's decision in training, they scored 71.7% (increased by 26.7%), 58.4% (increased by 3.4%), and 88.6% (increased by 18.7%) respectively. Only Coach 3 showed an increase 25.9% to 66% in athlete's decisions in training. In the final phase, based on the percentage, coaches succeeded in delegating more authority to athletes compared to the previous phases. Coach 1 recorded a 20.1% increase (to 68.4%), followed by Coach 2 who demonstrated an increase of 0.2% (to 41.8%), Coach 3 improved by 26.6% (to 92.6%), and Coach 4 improved by 32.5% (to

43.9%). However, Coach 1, 2 and 4, still scored quite high percentages of coach's decisions by recording 31.6%, 58.2% and 56.1% respectively.

Table 3: Coaches' authority behavioural changes (%)

	Authority	Pre	Mid	Post
Coach 1	Athlete decisions	55.0	28.3	68.4
Netball	Coach decisions	45.0	71.7	31.6
Coach 2	Athlete decisions	45.0	41.6	41.8
Women's Soccer	Coach decisions	55.0	58.4	58.2
Coach 3	Athlete decisions	30.1	66.0	92.6
Trampolining	Coach decisions	69.9	34.0	7.4
Coach 4	Athlete decisions	27.4	11.4	43.9
Track & Field	Coach decisions	72.6	88.6	56.1

Recognition

In the pre-intervention phase, Coach 2 scored a high 54.5% of public normative feedback in the recognition structure (see Table 4). Coach 3 scored a maximum of 100% by giving his athletes private self-referenced recognition, and Coach 1 scored 89.7% for the same mastery structure. Most coaches in mid-intervention phase, managed to improve in giving private mastery recognition to their athletes, except for Coach 1 who dropped just 0.8% to 88.9%. Coach 3 scored 100% self-referenced recognition in his session, while Coach 2 and Coach 4 increased by 28.1% (to 73.6%) and 10.5% (to 84.9%) respectively, compared to the previous phase. All coaches made significant changes in giving self-referenced recognition during the final phase. Coach 3 and 4 recorded maximum percentage of 100.0% each, while other coaches increased by 9.9% to 98.8% (Coach 1) and 22.6% to 96.2% (Coach 2) in providing private self-referenced feedback on effort and improvement in their training session.

Table 4: Coaches' recognition behavioural changes (%)

	Recognition	Pre	Mid	Post
Coach 1	Private Self-referenced	89.7	88.9	98.8
Netball	Public normative	10.3	11.1	1.2
Coach 2	Private Self-referenced	45.5	73.6	96.2
Women's Soccer	Public normative	54.5	26.4	3.8
Coach 3	Private Self-referenced	100	100	100
Trampolining	Public normative	0	0	0
Coach 4	Private Self-referenced	74.5	84.9	100
Track & Field	Public normative	25.5	15.1	0

Grouping

In the pre-intervention phase, Coach 2 conducted 89.3% of her training by coaching the athletes in a large group (ego involving) and Coach 4, 43.3%. On the other hand, Coach 3 spent 93.1% and Coach 1 55.2% of their training session with their athletes in small mixed-ability groups (mastery involving) (see Table 5). In the mid-intervention phase all coaches did well in managing their athletes in small mixed ability groups. Coach 1 had increased by 14.4% (to 69.6%), Coach 2 increased by 53.6% (to 74.3%), Coach 3 increased by 1.8% (to 94.9%), and Coach 4 increased by 1.1% (to 57.8%). In contrast, only Coach 4 split his

athletes into ability group (14.3%) and Coach 1 also increased his use of large groups by 3.9% (to 30.4%).

Even though all coaches divided their athletes into small mixed ability groups in the final phase (i.e., Coach 1- 71.1%; Coach 2 – 75.8%; Coach 3 – 97.2%; and Coach 4 – 77.4%), they also conducted some part of the training in large groups (e.g., Coach 1 – 28.9%; Coach 2 – 24.2%; Coach 3 – 2.8%; and Coach 4 – 22.6%).

Table 5: Coaches' grouping TARGET behavioural changes (%)

	Grouping	Pre	Mid	Post
Coach 1	Small Mixed Ability	55.2	69.6	71.1
Netball	Ability Groups	21.4	0.0	0.0
	Large Group	23.5	30.4	28.9
Coach 2	Small Mixed Ability	10.7	74.3	75.8
Women's Soccer	Ability Groups	0.0	0.0	0.0
	Large Group	89.3	25.7	24.2
Coach 3	Small Mixed Ability	93.1	94.9	97.2
Trampolining	Ability Groups	0.0	0.0	0.0
	Large Group	6.9	5.1	2.8
Coach 4	Small Mixed Ability	56.7	57.8	77.4
Track & Field	Ability Groups	0.0	14.3	0.0
	Large Group	43.3	27.8	22.6

Evaluation

For the evaluation structure in the pre-intervention phase, Coach 2 scored high in giving public evaluation (63.4%) to her athletes, while Coach 1 scored 46.5% in general feedback, compared to only 44.8% private evaluation (see Table 6). Even though general feedback was coded as neither task nor ego, this score was higher than mastery private feedback. Coach 3 and 4 gave private evaluative feedback to their athletes with the score of 98.7% and 55.2% respectively.

Table 6: Coaches' evaluation TARGET behavioural changes (%)

	Evaluation	Pre	Mid	Post
Coach 1	Private Feedback	44.8	73.5	64.7
Netball	Public Feedback	8.6	5.7	0.8
	General Feedback	46.5	20.8	32.8
	Luck	0.0	0.0	1.7
Coach 2	Private Feedback	11.0	51.7	68.0
Women's Soccer	Public Feedback	64.3	46.6	0.0
	General Feedback	25.6	1.7	32.0
	Luck	0.0	0.0	1.7
Coach 3	Private Feedback	98.7	100	99.1
Trampolining	Public Feedback	0.0	0.0	0.0
	General Feedback	1.3	0.0	0.9
	Luck	0.0	0.0	0.0
Coach 4	Private Feedback	55.2	73.8	70.9
Track & Field	Public Feedback	42.5	4.8	0.0
	General Feedback	2.3	21.4	29.1
	Luck	0.0	0.0	0.0

The coaches showed increased mastery in the evaluation structure in the mid-intervention phase. They used more self-referenced private evaluation, with Coaches 1, 2, 3 and 4 showing increases of 18.3%, 41.0%, 6.9%, and 17.1% respectively (i.e., Coach 1 – 73.5%; Coach 2 – 51.7%; Coach 3 – 100%; and Coach 4 – 73.8%). In addition, after the first intervention, Coach 1 reduced her general feedback from 46.55% to 20.8%, while Coach 4 scored a higher 21.4% from 2.3%. In the final phase, instead of giving public feedback to the athletes, some coaches gave more neutral (neither ego nor mastery involved) general feedback, with Coach 1 scoring 32.8% (increased by 12.0%), Coach 2 – 32.0% (increased by 30.3%), and Coach 4 – 29.1% (increased by 7.7%) compared to the previous phase. The coaches gave relatively high levels of private feedback as opposed to public feedback to their athletes (i.e., Coach 1 – 64.7%; Coach 2 – 68.0%; Coach 3 – 99.1%; and Coach 4 – 70.9%) in this final phase. However, there were slight drops in these percentages by Coach 1 (9.8%), Coach 3 (0.9%), and Coach 4 (2.9%) compared to the mid-intervention phase.

Time

Finally, for the time structure, Coach 2, 3 and 4 scored high in inflexible time during the training in the pre-intervention phase, with 67.4%, 56%, and 59.7% respectively. The inactive time was between 13.4% and 37.6% for all coaches (see Table 7). In this pre-intervention phase, only Coach 1 scored a 52.9% for allowing her athletes flexible time in training. Interestingly, at this pre-intervention stage, all coaches scored relatively high percentage of inactive time (i.e., Coach 1 - 37.6%; Coach 2 – 32.6%; Coach 3 – 13.9%; and Coach 4 – 13.4%).

Table 7: Coaches' time TARGET behavioural changes (%)

	Time	Pre	Mid	Post
Coach 1 Netball	Flexible	52.9	25.9	66.5
	Inactive	37.6	22.5	18.9
	Inflexible	9.5	51.7	14.6
Coach 2 Women's Soccer	Flexible	0.0	47.8	46.1
	Inactive	32.6	30.5	27.5
	Inflexible	67.4	21.7	26.4
Coach 3 Trampolineing	Flexible	30.1	72.4	95.8
	Inactive	13.9	11.5	3.1
	Inflexible	56.0	16.1	1.1
Coach 4 Track & Field	Flexible	26.9	38.7	63.1
	Inactive	13.4	24.8	18.0
	Inflexible	59.7	36.5	18.9

There were positive improvements in the mastery time structure during the mid-intervention phase. Coaches 2 and 3 gave more flexible time to their athletes by scoring 47.8% (increase of 47.8%) and 72.4% (increase of 42.3%) respectively. However, other coaches scored high on inflexible time (e.g. Coach 1 - 51.7% and Coach 4 - 56.6%). All coaches still scored a relatively high percentage of inactive time in their training session. Coach 4 used 34.7% of her session where the athletes were inactive, followed by Coach 2 (30.5%), Coach 1 (22.5%), and Coach 3 (11.5%). Finally, in the post-intervention phase, most coaches managed to increase their flexible time compared to the previous stages. Coach 3 conducted 95.8% flexible time, increased by 23.4% from the previous session. This was

followed by Coach 1 (66.5%) with an increased 20.3%, and Coach 4 (43.9%) increased by 35.2% compared to the previous session. On the other hand, Coach 2 recorded a lower 46.1%, compared to 47.8% of flexible time in her mid-intervention stage, and recorded a high level of inflexible time (26.4%).

QUESTIONNAIRE DATA

Internal Consistencies of the Scales and Subscales

In the Pre-intervention stage, athletes were requested to respond to a questionnaire consisting of the PMCSQ-2 (29 items) and POSQ (12 items). Reliability analysis using Cronbach's alpha [31] was conducted on each of the questionnaires to measure the internal consistency of each subscales (see Table 8.). According to Ntoumanis [30], ideally alphas should be between .70 and .90. On the basis of this, the intra-team rivalry subscale was dropped from any subsequent analysis. Post-intervention PMCSQ2 importance, improvement and POSQ mastery were slightly below .70, but were retained on the basis of their high pre-intervention scores, as shown in Table 8.

Table 8: PMCSQ-2 Pre- and post-intervention cronbach alphas

PMCSQ-2	Pre-int	Post-int
PMCSQ-2	.80	.80
Cooperative learning		
PMCSQ-2	.78	.65
Important role		
PMCSQ-2	.72	.67
Improvement		
PMCSQ-2	.88	.88
Punishment		
PMCSQ-2	.93	.91
Unequal recognition		
PMCSQ-2	.41*	.63*
Intra-team rivalry		
PMCSQ-2	.87	.86
Mastery		
PMCSQ-2	.84	.90
Ego		
POSQ	.87	.66
Task		
POSQ	.74	.77
Ego		

*Dropped from any subsequent analysis.

PRE-POST INTERVENTION ANALYSIS

In order to assess the changes in athletes' perceptions of the motivational climate, as assessed by the PMCSQ 2 questionnaire, from pre- to post-intervention, a series of Wilcoxon tests were conducted for non-parametric data [30]. The findings (see Table 9) reveal a significant increase in perceptions of all mastery subscales, and a significant decreased in all ego subscales.

Assessment of the changes in athletes' goal orientations from pre- to post-intervention are also presented in Table 9, which reveals the pre-to post intervention differences in the POSQ questionnaire data. The findings revealed a significant increase in task goal orientations, and a significant decreased in ego goal orientations.

Table 9: Wilcoxon tests for pre- to post-intervention differences

Sub-scales	Pre-int M (SD)	Post-int M (SD)	N	Z	p
PMCSQ-2	3.80 (.48)	4.14 (.34)	43	-3.70**	.00
Cooperative learning					
PMCSQ-2	3.51 (.65)	4.02 (.32)	43	-3.76**	.00
Important role					
PMCSQ-2	3.80 (.50)	4.54 (.33)	43	-5.38	.00
Improvement					
PMCSQ-2	2.47 (.85)	1.80 (.55)	43	-3.73**	.00
Punishment					
PMCSQ-2	3.12 (1.04)	2.04 (.63)	43	-4.76**	.00
Unequal recognition					
PMCSQ-2 Mastery	3.71 (.44)	4.21 (.28)	43	-5.05**	.00
PMCSQ-2 Ego	2.81 (.61)	1.98 (.50)	43	-5.14**	.00
POSQ-2 Task	4.35 (.51)	4.60 (.28)	43	-2.35**	.02
POSQ-2 Ego	3.28 (.63)	2.12 (.56)	43	-5.32**	.00

**p<.05

DISCUSSION

In general, considering the combined coach behaviours, there was a move towards more mastery coaching behaviours in all the TARGET structures as a result of the intervention programme. Furthermore, athletes perceived the motivational climate to be significantly more mastery and less ego focused on all of the PMCSQ2 subscales and changed their goal orientations to be more task (mastery) oriented and less ego oriented, from pre to post-intervention. These results suggest that the implementation of a mastery intervention with coaches, based on observations of their TARGET behaviours and guidance on how they can modify these behaviours to be more mastery focused, can lead to significant increases in athletes' perceptions of a mastery climate and task goal orientations. Given the adaptive motivational responses that have been consistently associated with mastery involving goals, such as a positive attitude towards the activity, feelings of satisfaction, high perceptions of ability, the choice of challenging tasks, high intrinsic motivation, and placing a high value on effort and the process of learning [13-15], this intervention has important implications for coaching and coach education.

Beginning with a focus on the task structure [9], these results reveal that over the period of the five month intervention, the coaches had made mastery changes to the task structure by encouraging athletes to set more self-referenced mastery goals, and planning and designing more differentiated and varied activities to challenge different levels of ability. Educational researchers [e.g., 32], have argued for variety, diversity and novelty in the structure of learning tasks and found that multi-dimensional settings, with variety and novelty of tasks, develop learners' sense of their own ability which is not dependent on social comparison. Furthermore, setting tasks for inclusion and differentiation have been identified

as key elements in teaching PE [33, 34]. Such principles of learning and teaching are equally applicable to sport coaching where the emphasis should be on creating differentiated and inclusive learning environments to challenge and engage all athletes at their own personal level of achievement. This is, however, a very challenging area for coaches and further research and coach education is required to engage with the complexities of this in real life coaching situations.

In the authority structure, the results suggest that the coaches increased their athletes' opportunities to participate actively by make decisions and choices in training and taking on leadership roles, thus promoting a mastery climate [9, 16]. According to Kidman [35], athletes will be more highly motivated regarding their learning, have greater understanding of skills and tactics, and develop better decision making abilities if they are given greater involvement in their personal development. However, consistent with previous work [e.g., 36, 37], the concept of empowerment and athletes' autonomy within the coaching process is not unproblematic in sport coaching, with some coaches preferring to maintain the authority themselves for good reasons. For example in trampolining, because of the health and safety standards, the coach is often required to be in control in order to avoid potential injury to the athletes. Moreover, for some types of training (e.g., drills and set-pieces in football) coaches may need the authority to give more instructions, maintain the training tempo and to achieve the training objectives of the session within a set time. The level of experience and maturity of the athletes may also be a factor for consideration by coaches in determining how much authority to give to the athletes, with less experienced athletes' potentially requiring more guidance to 'scaffold' their learning. These areas require further investigation in order to consider the situational differences in sport coaching contexts.

Consistent with Ames [9], the coaches, on the whole, managed to increase their rate of private mastery focused recognition to the athletes as the intervention progressed. Mawer [38] found that effective practitioners individualize feedback for personal levels of mastery and understanding, and do not make comparisons between learners. Such positive recognition and evaluation has been found to increase interest in learning, self-confidence and satisfaction [9], all of which are essential in developing commitment to participation in sport. However, the public versus private feedback is a contentious area with some practitioners insisting that constructive feedback given publically can provides a learning opportunity for all athletes in the group, as opposed to only the one person receiving that recognition if given privately [19]. Furthermore, the public nature of PE and sport coaching makes it very difficult to provide totally private recognition without others overhearing it, even if that is the intention [24].

All the coaches increased their use of mixed ability cooperative groups at each phase of the intervention but for some this was more obvious than others, with the team sports showing a greater change in comparison to the individual sports. Opportunity for group work is usually greater in team sports compared to individual sports, but groupings in team sports are often organised according to positions or team units in order to work on set moves and game strategies. For more technical sports like trampolining and track & field athletics, there may some merit in grouping athletes according to ability in order to challenge participants at their own level of ability and encourage them to work together with their peers in giving more technical feedback in order to promote an effective learning climate in training. This is a difficult area in sport coaching and one that requires more qualitative investigation with both coaches and athletes in order to identify the most effective learning environment for all athletes.

In the evaluation structure, consistent with Ames' [9] notion that athletes should be

evaluated privately based on individual improvement and effort, the coaches increased their levels of mastery evaluation during the intervention. This structure has a lot in common with the recognition structure, but with more of an emphasis on evaluative judgements which are dependent on how athletes' personally define success [2]. The results of this study suggest that the athletes' achievement goal orientations became significantly more task and less ego oriented as a result of the intervention. It could be surmised, therefore, that their personal definitions of success and the criteria for self evaluation became more self referenced over the five months.

Even though previous research [e.g., 9, 16, 21], has suggested that athletes should be given sufficient and flexible time to complete learning tasks, the sport coaches in this study were constrained by set training times and restrictions on the venue and facilities. Despite this, however, the coaches still managed to give more flexible time to the athletes as the intervention progressed. Allowing flexible time to practise and learn has been identified as an effective teaching strategy, and one that allows for differentiation in learning [34]. Moreover, flexibility in the time structure encourages individual progress, which is an important facet in promoting a mastery climate [9]. Thus, the increase in flexible time from pre- to post-intervention is viewed positively in relation to athlete learning and differentiation.

CONCLUSION

This study shows that a TARGET intervention with coaches can influence their coaching behaviours to be more mastery involving and significantly increase athletes' perceptions of a mastery climate and task goal orientations, while decreasing perceptions of an ego climate and ego orientations. Given the adaptive motivational responses associated with a perceived mastery climate and task goal orientations, such as greater enjoyment, satisfaction and positive attitude [e.g., 13, 18], this study has important implications for coaching practice.

The results also reveal some situational differences between coaches which may be influenced by the type and nature of the sport, age and experience of the athletes, or differences in the physical coaching environment. These differences should, therefore, be taken into account in implementing the TARGET structures within any sport coaching situation, as every situation is unique. Furthermore, every coach and athlete is unique, so attempting to apply a theoretical framework such as TARGET precisely, without any consideration for the 'who' of the coach or athlete, may be problematic. Further qualitative research into the TARGET structures and other areas outside of TARGET is, therefore, recommended in order to assist coaches and coach educators in promoting the most effective motivational climate for athletes.

Currently, there is no perceptual measure of the TARGET structures in sport and an additional line of research would be to develop such a measure, to be used in conjunction with a sport specific observational measure of the TARGET behaviours, such as the one used in this study [21]. This would enable triangulation and the identification of the consistency between perceived and observed TARGET structures. Furthermore, if used with a measure of perceptions of the motivational climate, such as the Perceived Motivational Climate in Sport Questionnaire (PMCSQ 2) [28], it would enable researchers and practitioners to determine the inter-dependency and relative importance of each of the TARGET structures in influencing perceptions of the motivational climate.

The coaches in this study had the luxury of working with a researcher who guided them towards the implementation of the TARGET structures. This proved to be an effective way of developing reflective coaching, specifically focused on enhancing the motivational

climate for the athletes. In real coaching situations, however, coaches seldom have this opportunity. One way to develop such a learning environment for the coaches is to implement an action research approach into coach education programmes. Such an approach has recently been utilised in a coach education programme by Jones et al. [39] and proved to be successful in developing coaches' reflective practice and a 'community of practice' [40] in which to share their ideas and experiences.

Some of the limitations of this study are the small sample size and the lack of a control group to compare the findings against. As such, the study serves as a pilot for future studies of this nature to build upon.

REFERENCES

1. Smith, R. E., Smoll, F. L. and Cumming, S. P., Effects of a Motivational Climate Intervention for Coaches on Young Athletes' Sport Performance Anxiety, *Journal of Sport and Exercise Psychology*, 2007, 29, 39-59.
2. Nicholls, J. G., *The Competitive Ethos and Democratic Education*, Harvard University Press, Cambridge, MA, 1989.
3. Duda, J.L. and Hall, H.K., Achievement Goal Theory in Sport: Recent Extensions and Future Directions, in: Singer, R., Hausenblas, H., and Janelle, C., eds., *Handbook of Sport Psychology*, 2nd edn., Wiley, New York, 2001, 417-443.
4. Roberts, G. C., Treasure, D. C. and Kavussanu, M., Orthogonality of Achievement Goals and its Relationship to Beliefs About Success and Satisfaction in Sport. *The Sport Psychologist*, 1996, 10, 398-408.
5. Dweck, C.S., Motivational Processes Affecting Learning, *American Psychologist*, 1986, 41, 1040-1048.
6. Dweck, C. and Leggett, E., A Social-Cognitive Approach to Motivation and Personality, *Psychological Review*, 1988, 95, 256-73.
7. Nicholls, J. G., Achievement Motivation: Conceptions of Ability, Subjective Experience, Task Choice, and Performance, *Psychological Review*, 1984, 91, 328-346.
8. Ames, C., Competitive, Cooperative, and Individualistic Goal Structures: A Motivational Analysis, in: Ames, R. and Ames, C., eds., *Research on Motivation in Education: Student Motivation*, Academic Press, New York, 1984, 177-207.
9. Ames, C., Achievement Goals, Motivational Climate, and Motivational Processes, in: Roberts, G.C., ed., *Motivation in Sport and Exercise*, Human Kinetics, Champaign, IL, 1992, 161-176.
10. Ames, C. and Archer, J., Achievement Goals in the Classroom: Students' Learning Strategies and Motivation Processes, *Journal of Educational Psychology*, 1988, 80(3), 260-267.
11. Chi, L., Achievement Goal Theory, in: Morris, T and Summers, J., eds., *Sport Psychology: Theory, Applications, and Issues*, 2nd edn., Wiley, Milton, Australia, 2004, 152-174.
12. Duda, J.L. and Ntoumanis, N., After-School Sport for Children: Implications of a Task Involving Motivational Climate, in: Mahoney, J.L., Larson, R.W. and Eccles, J.S., eds., *Organized Activities as Contexts of Development: Extra Curricular Activities, after School and Community Programs*, Erlbaum, Mahwah, NJ, 2005, 311-330.
13. Carpenter, P. J. and Morgan, K., Motivational Climate, Personal Goal Perspectives, and Cognitive and Affective Responses in Physical Education Classes, *European Journal of Physical Education*, 1999, 4, 31-41.
14. Goudas, M. and Biddle, S.J.H., Perceived Motivational Climate and Intrinsic Motivation in School Physical Education Classes, *European Journal of Psychology of Education*, 1994, 2, 241-250.
15. Treasure, D. C., Perceptions of the Motivational Climate and Elementary School Children's Cognitive and Affective Responses, *Journal of Sport & Exercise Psychology*, 1997, 19, 278-290.
16. Epstein, J., Family Structures and Student Motivation: A Developmental Perspective, in C. Ames, C. and Ames, eds., Ames, R and Ames, C., eds., *Research on Motivation in Education: Student Motivation (Vol 3)*: Academic Press, New York, 1989, 259-295.

17. Smoll, F.L., Smith, R.E., and Cumming, S.P., Effects of a Psychoeducational Intervention for Coaches on Motivational Climate and Changes in Young Athletes' Achievement Goals, *Journal of Clinical Sport Psychology*, 2007, 1, 23-46.
18. Digelidis, N., Papaioannou, A., Laparidis, K. and Christodoulidis, T., A One Year Intervention in 7th Grade Physical Education Classes Aiming to Change Motivational Climate and Attitudes Towards Exercise, *Psychology of Sport and Exercise*, 2004, 4, 194-210.
19. Morgan, K. and Carpenter, P. J., Effects of Manipulating the Motivational Climate in Physical Education Lessons, *European Journal of Physical Education*, 2002, 8(3), 209-232.
20. Solmon, M. A., Impact of Motivational Climate on Students' Behaviors and Perceptions in a Physical Education Setting, *Journal of Educational Psychology*, 1996, 88, 731- 738.
21. Morgan, K., Sproule, J., Weigand, D. and Carpenter, P.J., A Computer-Based Observational Assessment of the Teaching Behaviours that Influence Motivational Climate in Physical Education, *Physical Education and Sport Pedagogy*, 2005, 10 (1), 83-105.
22. Sharpe, T. and Koperwas, J., *BEST: Behavioral Evaluation Strategy and Taxonomy Software*, Sage Publications, Inc, Thousand Oaks, CA, 1999.
23. Langan, E., Blake, C. and Lonsdale, C., Systematic Review of the Effectiveness of Interpersonal Coach Education Interventions on Athlete Outcomes, *Psychology of Sport and Exercise*, 2013, 14, 37-49.
24. Morgan, K. and Kingston, K., Development of a Self-Observation Mastery Intervention Programme for Teacher Education, *Physical Education and Sport Pedagogy*, 2008, 13(2), 109-129.
25. Williams, J., The Development of a Real-Time Data Capture Application for Rugby Union, in: O'Donoghue, P. and Hughes, M., eds., *World Congress of Performance Analysis of Sport VI (Belfast)*, 6th edn., University of Wales Institute Press, Cardiff, 2004.
26. Altman, D., *Practical Statistics for Medical Research*, Chapman Hall, London, 1991.
27. Cohen, J., A Coefficient of Agreement for Nominal Scales, *Educational and Psychological Measurement*, 1960, 20, 37-46.
28. Newton, M., Duda, J. L. and Yin, Z., Examination of the Psychometric Properties of the Perceived Motivational Climate in Sport Questionnaire-2 in a Sample of Female Athletes, *Journal of Sport Sciences*, 2000, 18, 275-290.
29. Roberts, G. C., Treasure, D. C. and Balague, G., Achievement Goals in Sport: The Development and Validation of the Perception of Success Questionnaire, *Journal of Sport Sciences*, 1998, 16, 337-347.
30. Ntoumanis, N., *A Step by Step Guide to SPSS for Sport and Exercise Studies*, Routledge, London, 2001.
31. Cronbach, L.J., Coefficient Alpha and the Internal Structure of Tests, *Psychometrika*, 1951, 16, 297-334.
32. Rosenholtz, S.J. and Simpson, C., Classroom Organization and Student Stratification. *The Elementary School Journal*, 1984, 85, 21-37.
33. Williams, A., *Teaching Physical Education*, David Fulton, London, 1998.
34. Capel, S., ed., *Learning to Teach Physical Education in the Secondary School*, Routledge, London, 1997.
35. Kidman, L., *Developing Decision Makers: An Empowerment Approach to Coaching*, Innovative Print Communications, Christchurch, NZ, 2001.
36. Jones, R. L., Applying Empowerment in Coaching: Some Considerations, in: L. Kidman, L., ed., *Developing Decision Makers: An Empowerment Approach to Coaching*, Innovative Print Communications, Christchurch, NZ, 2001. 83-94.
37. Jones, R.L. and Standage, M., First Among Equals: Shared Leadership in the Coaching Context, in Jones, R.L., ed., *The Sports Coach as Educator: Re-conceptualising Sports Coaching*, Routledge, London, 2006; 65-76.
38. Mawer, M., *The Effective Teaching of Physical Education*, Longman, Essex, 1995.
39. Jones, R.L., Morgan K. and Harris, K., Developing Coaching Pedagogy: Seeking a Better Integration of Theory and Practice, *Sport, Education and Society*, 2012, 17(3), 313-3
40. Wenger, E., *Communities of Practice: Learning, Meaning and Identity*, Cambridge, University Press, 1998.