Psychology of Sport & Exercise 51 (2020) 101714

Contents lists available at ScienceDirect

Psychology of Sport & Exercise

journal homepage: www.elsevier.com/locate/psychsport

Approach-achievement goals and motivational context on psycho-physiological functioning and performance among novice basketball players

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ARTICLE INFO

Keywords:
Achievement goals
Autonomous motivation
Controlling motivation
Physiological functioning
Psychological well-being
Motor performance

ABSTRACT

Objectives: Drawing from an integrated motivational model (Vansteenkiste, Lens, Elliot, Soenens, & Mouratidis, 2014), this study tested the impact of induced approach-based achievement goal states under different motivational contexts on the psycho-physiological functioning and motor task performance of novice basketball players.

Design: A 3 × 2 (Goal [task-/self-/other-approach] x Context [autonomy-supportive/controlling]) repeated measures experimental design was employed.

Method: 114 novice participants (M_{age} = 23.53; SD = 4.56) performed a basketball shooting task. They were subsequently randomly assigned to one of six experimental conditions before repeating this task. Physiological (heart rate [HR] and blood pressure [BP]) and psychological (stress appraisals, state anxiety, task enjoyment, perceived competence, and goal attainment) data were captured at different intervals throughout the experiment.

Results: Factorial ANOVAs revealed participants: 1) performing under a controlling motivational context reported significantly higher HR ($p < .001$) and systolic BP ($p < .05$) post-task compared to those operating within an autonomy-supportive environment, 2) induced to an other-approach goal group, recorded significantly higher diastolic BP ($p < .05$) than those induced to self- and task-approach goals post-task, 3) adopting a task-approach goal under controlling conditions appraised the shooting task as significantly more threatening ($p < .05$) than their counterparts in the task-approach autonomy-supportive condition, and finally, 4) following approach-based goals under an autonomy-supportive context significantly improved their performance ($p < .001$) from pre-to post-shooting task.

Conclusions: Our findings provide limited support for an integrated motivational model and are discussed in relation to their unique theoretical and practical utility.

1. Introduction

Achievement goal theory (AGT; Ames, 1992; Dweck, 1986; Elliot, 1999; Nicholls, 1984) and self-determination theory (SDT; Deci & Ryan, 1985) are two of the most pertinent motivational approaches for independently and together explaining variability in the performance, psychological, and physiological functioning among sport participants (e.g., Adie & Bartholomew, 2013). Past sport studies have attempted to enhance the prediction of performance and well-being by combining the tenets of one motivational theory (i.e., basic psychological needs theory; Ryan & Deci, 2000) whilst incorporating key constructs of the other (i.e., motivational climate; Ames, 1992). This approach is problematic as researchers decide which assumptions are compatible between theories, and ignore the others (see Ntoumanis, 2001). Until recently, one challenge that has affected AGT-SDT research has been the lack of an integrative conceptual framework. To this end, Vansteenkiste, Lens, Elliot, Soenens, and Mouratidis (2014) developed and have empirically supported a conceptual model integrating the contemporary approach and avoidance AGT with SDT (e.g., Michou, Matos, Gargurevich, Gumus, & Herrera, 2016; Vansteenkiste, Mouratidis, Van Reit, & Lens, 2014). The purpose of the current study was to provide an experimental test of this conceptual model. More specifically, we aimed to ascertain whether the motivational context underpinning achievement goal adoption had differing effects on the psycho-physiological functioning and performance of participants executing a novel sports task.

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https://doi.org/10.1016/j.psychsport.2020.101714
Received 29 May 2019; Received in revised form 1 May 2020; Accepted 7 May 2020
Available online 10 July 2020

1.1. The achievement goal approach

Over the past four decades, AGT (e.g., Dweck, 1986; Elliot, 1999; Nicholls, 1984) has been at the forefront of studying achievement motivation in sport (e.g., Duda, 2005). The earliest conceptualization proposed a dichotomous approach (Dweck, 1986; Nicholls, 1984) distinguishing between task (or mastery) and ego (or performance) goals. A mastery goal refers to striving for self- or task-referenced standards of competence (i.e., success is demonstrated via self-improvement or task mastery), whereas a performance goal is focused on attaining other-referenced standards of competence (i.e., success is construed by outperforming others). In line with theoretical propositions, mastery goals have repeatedly been found to predict positive achievement-related cognitions, emotions, and behaviors, as well as healthy functioning in sport (see Adie & Bartholomew, 2013; Duda, 2005). However, performance goals have produced an inconsistent set of findings in the dichotomous goal sport-based literature. For example, performance goals have been found to be related (and unrelated) to both adaptive and maladaptive outcomes (e.g., Dewar & Kavussanu, 2012; Spray, Wang, Biddle, & Chatzisarantis, 2006).

In addressing the ambiguity surrounding the performance goal findings, Elliot and colleagues (Elliot, 1999; Elliot & McGregor, 2001) revised the original dichotomous goal approach by establishing the hierarchical model of achievement motivation (HMAM). According to this revised AGT, achievement goals are conceptualized along two dimensions of competence: definition (self-, task- and other-referenced) and valence (approach and avoidance). The crossing of these dimensions led to the prominent use of the 2 × 2 achievement goal framework in sport (e.g., Conroy, Elliot, & Hofer, 2003) which assumed the salience of four achievement goals to be operational in this setting: 1) Mastery-Approach (MAp; striving to attain self-/task-referenced competence), 2) Mastery-Avoidance (MAv; striving to avoid self-/task-referenced incompetence), 3) Performance-Approach (PAp; striving to attain other-referenced competence), and 4) Performance-Avoidance (PAv, striving to avoid other-referenced incompetence).

Aligned with theoretical predictions (Elliot & Conroy, 2005), sport research has found MAp goal adoption to be associated with positive outcomes, to include performance and indices of optimal functioning (Adie, Duda, & Ntoumanis, 2010; Van Yperen, Blaga, & Postmes, 2014). However, on occasion, researchers have suggested that the merging of the omnibus mastery approach goal has masked over some findings (Elliot & Thrash, 2001), leaving it unknown, whether its individual self- or task-components demonstrate direct links with studied outcomes. Elliot and Conroy (2005) initially assumed MAv goals would have fewer positive outcomes than MAp goals, and less negative consequences than PAv goals. The sport literature has repeatedly found MAv and PAv goals to both yield maladaptive consequences. PAp goal adoption was also posited to ensue in some positive consequences, but fewer than when pursuing a MAp goal (Elliot & Conroy, 2005). The sport-related findings in the literature have supported this latter supposition in as far as performance is concerned (e.g., Kavussanu, Morris, & Ring, 2009; Lochbaum & Gottardy, 2015), but have found that the long-term pursuit of PAp goals can be health-compromising (e.g., Adie et al., 2010). Based upon the meta-analytical findings of Lochbaum and Gottardy (2015), avoidance-based goals can be viewed as irrelevant if seeking performance enhancement and have consistently been related to diminished functioning (e.g., lower positive affect and increased worry and anxiety; Papaioannou, Zourbanos, Krommidas, & Ampatzoglou, 2012). Similar findings have been reported across other achievement contexts, including physical education and exercise domains (e.g., Lochbaum, Jean-Noel, Pinar, & Gilson, 2017; Lochbaum, Zanatta, & Kazak, 2020). In sum, the negative consequences of adopting avoidance-based goals are well documented as too are the equivalent effects of MAp and PAp goals on sport performance (Lochbaum & Gottardy, 2015). The implications of approach-based goals, however, on indices of psychological and physical well-being are less straight-forward. With this in mind, we decided to focus exclusively on the influence of approach-focused goals concerning the psycho-physiological functioning of sport performers.

It has also been argued and empirically tested recently that the predictive utility of mastery-based goals can be enhanced by separating them into *task*- and-*self*-based goals (Elliot, Murayama, & Pekrun, 2011): 1) Task-Approach (TAp; aims to attain task-referenced competence), 2) Task-Avoidance (TAv; aims to avoid task-referenced incompetence), 3) Self-Approach (SAp; aims to develop self-referenced competence), and 4) Self-Avoidance (SAv; aims to avoid self-referenced incompetence) goals. For the purposes of this study, we only drew on the three approach-based goals of the 3 × 2 model. The separation of TAp and SAp goals, along with other-approach (OAp [performance-approach]) goals, have predicted distinct achievement-related outcomes within a sport setting. Specifically, individuals pursuing an OAp goal demonstrated positive associations with conceptions of athletic ability whilst both TAp and SAp goals were found to relate positively to interest. Additionally, perceived competence was positively related to TAp goals but unrelated to SAp goals. In support of Elliot's (1999) proposal, this suggests that in the sport domain at least, positive perceptions of competence direct individuals focus towards the possibility of success, and so they are inclined to strive to demonstrate mastery and meet their potential (Morris & Kavussanu, 2008). Despite these initial encouraging findings, limited sport research has investigated the effects of approach-based goal pursuit from the 3 × 2 Achievement Goal Model (AGM; Elliot et al., 2011) on well-being and performance.

1.2. Self-determination theory

A complimentary theoretical framework relevant to understanding competence-based motivation, performance and the healthy functioning of sport participants is SDT (Conroy, Elliot, & Coatsworth, 2007; Deci & Ryan, 1985). According to SDT, individuals are more or less self-determined in their behavior (in this case, goal-directed pursuits), and this has implications for their psychological and physical well-being. To this end, goal-directed behavior is assumed to be regulated by autonomous or controlling motives. Research across different contexts has found autonomous motivation to be associated with higher adaptive consequences than controlled regulation (for a review, see Deci & Ryan, 2008). SDT assumes autonomous motivation is fostered by support from the perceived social environment created by significant others (e.g., coaches). An autonomy-supportive context is a key facet of the social environment that considers the participant's perspective, promotes choice and decision-making, provides a rationale for the task to be undertaken, acknowledges potential difficulty, and which uses non-controlling language (Ryan & Deci, 2000). In contrast, a controlling environment would entail pressuring language, exertion of excessive personal control, induced deadlines, rewards and threats, and display intimidation techniques that control participant's behavior (Bartholomew, Ntoumanis, & Thøgersen-Ntoumani, 2009). Sport research has consistently found significant others (e.g., coaches) that created autonomy-supportive environments promoted autonomy, which in turn, predicted optimal functioning (e.g., Reinboth, Duda, & Ntoumanis, 2004) and sport performance (e.g., Hooyman, Wulf, & Lewthwaite, 2014). The findings from the sport SDT-based literature also demonstrate implications of an interpersonally controlling environment on reducing self-determined behavior (or promoting controlled regulation), and subsequent diminished psycho-physiological functioning (Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011).

1.3. An integrated motivational model

Within the HMAM, it has been proposed that the endorsement of achievement goals may be influenced by competence-based constructs (e.g., achievement motives) and perceived environmental factors (e.g.,

the motivational context). Achievement motives (i.e., the need for achievement [NAch; the motive to succeed] and fear of failure [FF; the motive to avoid failure]), have been widely studied and it is well documented in previous research that MAp goals are instigated by the NAch, PAv and MAv goals by FF, and PAp goals by both motives (Elliot, 1999). Extending upon this, and from an SDT perspective, it has been suggested that individuals may pursue a goal for various reasons, proposing these reasons may not only trigger a goal but also help shape their consequential effects (Elliot & Thrash, 2001). The same goal may therefore behave differently based on the underlying reasons for pursuing it. This idea involves disentangling all reasons from the goal referent, and then recombining the goal with each unique reason, the interaction termed "goal complexes" (Senko & Tropiano, 2016). Each complex therefore fuses the goal and reason, rather than isolating and comparing the two elements, providing researchers with an opportunity to observe the potential moderating effects of reasons between goal adoption and well-being and performance (Senko & Tropiano, 2016). For example, a netball player pursuing an approach-based goal, or separately performing for autonomous reasons, is expected to experience a range of desirable well-being and performance outcomes. However, in considering the notion of goal-complexes, it is proposed two netballers could both be in pursuit of the same goal (e.g., OAp goal), but for very different reasons (e.g., autonomous vs controlling), and so will experience a differential pattern of outcomes, (i.e., OAp goal pursuit for autonomous reasons will yield adaptive benefits, whilst the same goal pursuit but for controlling reasons is expected to ensue in maladaptive consequences).

In line with these principles, it has been suggested that the alternative set of proposed antecedents, an individual's perception of environmental factors (i.e., the motivational context), may also differentially impact the consequential goal effects (Michou, Mouratidis, Lens, & Vansteenkiste, 2013). Until recently, few had considered exploring this goal-complex approach. With the inconsistent findings surrounding PAp goals, demonstrating positive associations with many adaptive, (e.g., performance, effort, positive affect; Lochbaum & Gottardy, 2015, Lochbaum et al., 2017; 2020), but also maladaptive outcomes (e.g., anxiety, worry and negative affect too; for a review, see Papaioannou et al., 2012) it would appear that, similar to the performance omnibus goal, they predict performance well, but usually at a cost to the athlete's welfare (Elliot & Moller, 2003). It has been proposed, to better explain and understand such complex relationships, researchers could extend this line of enquiry, testing goal complexes, incorporating key tenets from SDT's concepts of the underlying motivational context. Therefore, this study will investigate the potential interaction between approach-based achievement goals and the motivational context under which they are adopted in a novel sport situation, in explaining their relationship with psycho-physiological functioning and performance, the first study to experimentally do so.

Previous sport studies have attempted to integrate the HMAM (Elliot & McGregor, 2001) with SDT with a view to predicting well-being in sport. Vansteenkiste, Mouratidis, and Lens (2010) were the first group of researchers to adopt and empirically test this notion, focusing on unravelling the previous controversial findings surrounding OAp goals. They reported that OAp goal pursuit for autonomous reasons was beneficial for well-being, relating positively to affect and vitality, whereas the controlled reasons underlying OAp goals related positively to negative affect. This approach was further verified in sport (e.g., Vansteenkiste, Lens, et al., 2014) and in other achievement contexts such as education (e.g., Michou, Vansteenkiste, Mouratidis, & Lens, 2014).

Vansteenkiste, Lens, et al. (2014) and Vansteenkiste, Mouratidis, et al. (2014) eventually developed a conceptual model for integrating achievement goal theory with SDT, resulting in an enriched HMAM. They argued that autonomous and controlled regulations now play a moderating role in the relationship between achievement goals and their proposed outcomes. As such, it was assumed these regulations would relate differentially to cognitive, affective, and behavioral outcomes, explaining variance in addition to that accounted for by the strength of the endorsement of achievement goals themselves. A growing body of research, albeit correlational, examined the concomitants of the motivational context underpinning achievement goal pursuit (e.g., Delrue et al., 2016; Gaudreau & Braaten, 2016). Firstly, Benita, Roth, and Deci (2014) demonstrated that mastery goals (self-referenced only) predicted more positive emotional outcomes, such as self-reported interest and enjoyment on a hand-writing task, when adopted in an autonomy-supportive as opposed to an autonomy-suppressive (low autonomy-support) context. In extending this initial work in education, Benita, Shane, Egali, and Roth (2017) reported (1) other-goals yielded better performance than self-goals (study 1), (2) favoring self- and task-goals over other-goals with respect to pressure/tension experienced, and (3) the benefits of promoting task-, self- and other-referenced goals in an autonomy-supportive context, compared to an autonomy-suppressive context, on performance and emotional experience. Overall, these results suggested that while pursuit of other-goals may promote better performance engagement than self-goals, they also lead to more negative emotions. However, it must be noted, task- and self-referents were not directly compared (researchers compared self-goals to other-goals in study 1 and task-goals to other-goals in study 2) and so conclusions on validating the differentiation of mastery goals to their task- and self-competence referents could not be drawn. Furthermore, much evidence exists to suggest that low autonomy support is not the same as high control and so, this study does not accurately incorporate the motivational, concepts from SDT.

Examining the motivational context under which approach-goal pursuits occur is important. Based on the work above (Benita, Shane, Elgali, & Roth, 2017), as far as approach-goals are concerned the specific goal referent may not matter for determining well-being and performance so long as the reasons for pursuing approach goals are regulated in an autonomy-supportive environment. Nevertheless, the potential interactive effects between achievement goals and the motivational context could shed new theoretical insights in explaining the historical equivocal findings for PAp goals whilst revealing the most appropriate context and goal to pursue to achieve optimal functioning. It must be noted that none of the aforementioned experimental studies tested all three approach goals under different contexts simultaneously, nor used SDT's distinction of autonomy-supportive vs controlling motivational contexts. In extending this line of work, and to the best of our knowledge, we are the first to examine these simultaneous effects.

Beyond indices of well-being and performance, SDT and AGT approaches have seldom considered predicting physiological markers of healthy functioning among sport participants. Therefore, we were also interested in examining an individual's physiological functioning, specifically their appraisal and response to a stressful situation (e.g., competitive sport task). It is assumed and empirically supported that achievement goals, and the motivational context, play a role in determining how an athlete cognitively appraises a potentially stressful performance (Adie et al., 2010, 2008; Jones, Meijen, McCarthy, & Sheffield, 2009; McGregor & Elliot, 2002; Quested et al., 2011). Lazarus and Folkman (1984) differentiated between two types of cognitive appraisal: (1) a challenge state is experienced when an individual has sufficient resources available within their environment to meet the perceived demands of a task and (2) a threat state occurs when individual's personal resources fail to cope with task requirements, deeming psychological harm potentially imminent. To provide an account of physiological functioning in the unfolding stress process, researchers often monitor stress response via the assessment of cardiovascular reactivity (indexed by heart rate [HR] and blood pressure [BP], see Turner, Jones, Sheffield, Barker, & Coffee, 2014). A challenge response is characterized by an increase in cardiac activity along with a decrease in peripheral vascular resistance (Jones et al., 2009). In contrast, a threat response is also characterized by increases in cardiac activity and either no change or an increase in peripheral vascular

resistance which as a result typically causes blood pressure to rise (Blascovich & Mendes, 2000). By examining the motivational context underpinning achievement goal adoption, we sought to better understand why individuals cognitively appraise situations as a challenge, whilst others view it as a threat, and how this differentially affects their psycho-physiological functioning and performance. This will be the first study to adopt such a design, exploring individuals' physiological well-being using objective measures within this integrated conceptual framework.

1.4. The current research

The aim of our study was to investigate the effects of pursuing approach-based achievement goals induced under different motivational conditions on the psycho-physiological functioning and performance of novice basketball players. Based on past literature, we tentatively hypothesized that (1) pursuit of an OAp, relative to SAp and TAp goals, would lead to significantly reduced (1a) physiological functioning (e.g., higher HR & BP recordings) (1b) psychological functioning (e.g., increased threat appraisals and higher state-anxiety), and (1c) performance; (2) OAp goal pursuit would be exacerbated under a controlling motivational context and (3) pursuing approach-based achievement goals under an autonomy-supportive compared with a controlling context would result in enhanced (3a) physiological functioning (e.g., improved CV reactivity) (3b) psychological functioning (e.g., increased challenge appraisals, task enjoyment and perceived competence), and (3c) performance, regardless of goal type pursued.

2. Methods

2.1. Design and participants

Employing a 3 × 2 (Goal [task-, self-, other-approach] x Context [autonomy support/controlling context]) experimental design, 114 male (n = 62) and female (n = 52) novice basketball players (M_{age} = 23.53; SD = 4.56 years) from a large University in the West Midlands, UK, volunteered for the study. Only participants reporting none (n = 57) or limited recreational experience (n = 57) were entered into the study to control for initial basketball ability. To facilitate engagement with the achievement task used in the experiment, young adult participants with a competitive sporting background were selected.

2.2. Procedures and experimental manipulations

Following University ethical approval, the lead researcher with help from the Sports Performance Unit (SPU) contacted organized sport clubs within their University to invite them to participate in the experiment. To ensure freedom of choice, interested individuals contacted the lead researcher directly to organize participation. The experiment was conducted by the lead researcher, a confederate (qualified basketball coach) and a trained research assistant in an indoor sports hall. Upon arrival, participants received verbal and written instructions concerning the experiment and their rights to withdraw. After providing written consent, participants underwent a preliminary health screening including a cardiovascular assessment. All participants were declared fit to continue.

The cardiovascular assessment comprising participants' resting heart rate (HR) and blood pressure (BP) also served as a baseline measure for CV reactivity and was followed by the first trial of the experimental task (i.e., a basketball shooting task). Participants were then randomly allocated to one of six experimental conditions prior to attempting their second trial of the basketball shooting task: (1) task-approach autonomy-supportive (TAp-AS; [n = 20]), (2) task-approach controlling (TAp-Con; [n = 19]), (3) a self-approach autonomy-supportive (SAp-AS; [n = 19]), (4) self-approach controlling (SAp-Con; [n = 20]), (5) other-approach autonomy-supportive (OAp-AS; [n = 18]), and (6) other-approach controlling (OAp-Con; [n = 18]).

The experimental (induced goal-context) manipulations were presented via online audio-visual instructions. In the first instance, all participants watched a pre-recorded video of the confederate who helped initiate the background to, as well as the motivational context, of the experiment. Participants were informed that they had been selected at random by the SPU to take part in an audit of motor skills among young adults run in conjunction with the University sport science department. This deception was used to help set-up the experimental manipulations. Participants were under the pretense that they were being recorded performing a basketball shooting task. Each audio-visual presentation notified participants that their performance on the achievement task would be filmed for evaluative reasons by the SPU. This video also functioned to create the context (through subtle variations in the language and expressions used by the confederate) and to introduce the goal.

Subsequent instructions for inducing each goal were administered via the same online presentation. In doing so, language that reinforced either an autonomy-supportive (e.g., 'You are invited to adopt … ', 'Your recommended goal is … ' or 'Please consider if you would like to … ') or controlling (e.g., 'You must … ' and 'You have to … ') context was used to initiate reasons underpinning goal adoption. Two minor context deceptions were incorporated for the controlling condition: (1) participants were informed that their participation in the investigation would only be valuable to the extent they had to demonstrate successful goal pursuit, and (2) individuals were notified by the confederate and later reminded by the lead researcher that their second trial would be timed.

Participants received the following instructions depending on the experimental condition they were randomly allocated to:

TAp-AS goal[1]

'In this next trial, your recommended goal is to try to master the technique of the set-shot. You are invited to watch a video demonstration of this skill. The video demonstration is an opportunity to focus on mastering the three key elements of this skill. So, in your own time, please consider if you would like to adopt this goal'.

TAp-con goal

'In this next trial, you should aim to master the technique of the set-shot. You will now watch a video demonstration of this skill. You must now perform the task again'.

SAp-AS goal

'In this next trial, your recommended goal is to perform better than your previous attempt. In your own time, please consider if you would like you to adopt this goal to see if you can do better than you did the last time'.

SAp-con goal

'In this next trial, your goal should be to perform better than your previous attempt. You must now perform the task again'.

OAp-AS goal[1]

'You are invited to study Figure 1 below. In this next trial, your recommended goal is to try to outperform other players of a recreational standard. In your own time, please consider if you would like to adopt this goal. This may seem challenging, but others have been able to do it. You are invited to play again and try to better the 50% shooting average of your peers'.

OAp-con goal

[1] Participants in the TAp and OAp goal conditions also received additional information to help create the manipulations: (1) TAp goal groups (expert video demonstration of the set-shot technique) and (2) OAp goal groups (a graph displaying fabricated data of other participants completing this task as a performance referent).

'In this next trial, your goal is to outperform other players of a recreational standard. You should study Figure 1 below to determine the average percentage shooting success of recreational level players on this task. You must now perform the task again'.

Immediately following the manipulation delivery, participants were instructed they had a 2-minute period of time to mentally reflect on their goal for the upcoming task (see Turner et al., 2014). During this 2-minute period, HR was continually monitored followed by a BP recording. Participants then completed a manipulation check for their goal condition and a stress appraisal measure prior to their second performance trial. Next, participants repeated the shooting task under the different experimental conditions. The principal experimenter verbally reinforced the goal-context condition before participants performed the second and fourth set of shots during the second performance trial. Final recordings of physiological data were measured immediately post-task along with self-reported measures for the context manipulation check, goal attainment and indices of psychological functioning. All participants were debriefed at the end of the experiment which lasted approximately 35 min in total.

2.3. Measures

Manipulation checks. Immediate verbal and written confirmation following inducing the manipulations was obtained to ascertain participants had understood and followed the goal they had been assigned to. We also administered 3 adapted items from the 3 × 2 Achievement Goal Questionnaire for Sport (AGQ-S; Mascret, Elliot, & Cury, 2015) at the end of the experiment. These items captured TAp *('My experimental goal was to master the shooting technique')*, SAp *('My experimental goal was to perform better on this task than I did previously')*, and OAp *('My experimental goal was to outperform my peers')* goals. Scores were recorded on a 7-point Likert-scale ranging from 1 ("Strongly disagree") to 7 ("Strongly agree"). Items were selected based upon their high-performing factor loadings and internal consistency (Mascret et al., 2015).

Similar to Benita et al. (2014), a 4-item modified version of the Experimental Climate Questionnaire (ECQ; adapted from Williams & Deci, 1996) was administered to assess the degree to which participants felt their goal had been presented in an autonomy-supportive (e.g., "*I felt the experimenters offered me choice to accept my goal*") versus controlling manner (e.g., "*I felt pressured by the experimenters to pursue my goal*"). Scores were recorded on a 7-point Likert-scale ranging from 1 ("Not at all true") to 7 ("Very true").

Cardio-Vascular Reactivity (CVR). To measure cardio-vascular change as a response to stress, Heart Rate (HR) and Blood Pressure (BP) were obtained at four intervals throughout the experiment: 1) rest (T1), 2) pre-manipulation (T2), 3) immediately post-manipulation (T3), and 4) immediately post-task (T4). HR data were measured using a Polar FT1 Heart Rate Monitor (Polar Electro Oy, Kempele, Finland). HR data were recorded for a total of 5 min throughout the experiment; 1 min at T1 and T2, 2 min at T3 during the mental preparation phase (see Turner et al., 2014) and 1 min at T4. HR data were collected after every 15 s per minute monitored. At the same intervals, participant's blood pressure readings were obtained using an Omron Intelli-Sense Automatic Blood Pressure Monitor (M6 Comfort: Omron Healthcare Co., Ltd., Kyoto, Japan).

Performance. The basketball shooting task consisted of two trials (pre- and post-manipulation) of 25 set-shots towards the hoop from 5 marked positions along a semi-circle: markers 1 & 5 = 4.06m either side of the center of the hoop and 0.61m 'forward', markers 2 & 4 = 2.11m either side of the center of the hoop and 1.88m 'forward', and marker 3 = 3.63m directly 'forward' from the center of the hoop. A scoring system (based upon Hardy and Parfitt's [1991] scale) was developed with a higher score indicating a better performance; 3 points were awarded for a 'swoosh' (successful basket that touches the net only), 2 points for hitting the backboard or rim and into the basket, 1 point for hitting the backboard or rim and missing, and 0 points for a complete miss.

Cognitive Appraisals of Stress. An adapted 8-item version of the challenge and threat construal measure (McGregor & Elliot, 2002) was used to assess how participants appraised the second basketball shooting task. Participants responded to the stem "How do you feel about completing the next basketball set-shot task?" along a 7-point Likert-scale ranging from 1 ("Not at all true of me") to 7 ("Very true of me"). Example items for the challenge and threat measure included, "*I view this shooting task as a positive challenge*" and "*I view performing this shooting task as a threat*". The challenge and threat construal measure has demonstrated excellent factorial validity in sport (e.g., Adie, Duda, & Ntoumanis, 2008).

Competitive State Anxiety. The cognitive (8 items; e.g., *'I had self-doubts'*) and somatic (8 items, e.g., *'I felt tense in my stomach'*) anxiety subscales of the Competitive State Anxiety Inventory-2 (CSAI-2; Martens, Burton, & Vealey, 1990) were used to capture anxiety states experienced during the second performance trial. Items were rated on a 7-point Likert-scale from 1 ("Not at all true of me") to 7 ("Very true of me"). Past research has found the CSAI-2 to yield excellent predictive validity (Martens et al., 1990).

Enjoyment. An adapted 5-item measure based upon the enjoyment subscale of the Intrinsic Motivation Inventory (IMI; McAuley, Duncan, & Tammen, 1989) was employed to assess individual's enjoyment of the basketball shooting task (e.g., *'I enjoyed doing this activity very much'*). Scores were recorded on a 7-point Likert-scale ranging from 1 ("Not at all true") to 7 ("Very true"). This subscale has previously demonstrated acceptable internal consistency (e.g., McAuley et al., 1989).

Competence. A 5-item measure based upon the Perceived Competence subscale of the IMI (McAuley et al., 1989) was used to assess participants' degree of basketball ability following their second basketball shooting task (e.g., *'I think I was pretty good at this task'*). Scores were recorded on a 7-point Likert-scale ranging from 1 ("Not at all true") to 7 ("Very true"). This subscale has previously generated very good psychometric properties in sport research (e.g., Morris & Kavussanu, 2008).

Goal attainment. A single item measure was developed to assess to what extent participants felt they had achieved their adopted goal, (i.e., TAp goal [*'To what extent do you think you achieved your goal to master the technique for the basketball shooting task?'*]; SAp goal [*'To what extent do you think you achieved your goal to perform better on your second attempt at the basketball shooting task?'*]; OAp goal [*'To what extent do you think you achieved your goal to perform better than others of a similar standard?'*]). Scores were recorded on a 7-point Likert-scale ranging from 1 ("Not at all") to 7 ("Completely").

2.4. Data analysis

Based upon existing research and statistical guidelines, a series of ANOVA's were selected to analyze data. Due to the large correlations observed between the dependent variables of physiological functioning and psychological functioning, it was deemed inappropriate to conduct MANOVA analyses where the requirement is for dependent variables to be largely uncorrelated. Importance was placed upon reporting the effect sizes (using partial eta squared) for significant findings as a means of quantifying the size of the difference between experimental groups. It is also noted, that based on *a priori* power analysis, the sample size was slightly short of suggested parameters and this may increase the possibility of type two errors.

3. Results

3.1. Manipulation checks

The first goal manipulation test demonstrated that, when asked, each participant correctly identified the goal condition under which

Table 1
Descriptive statistics concerning the manipulation checks for goal and motivational context.

Variables	Experimental Manipulations		
	Goal		
	TAp	SAp	OAp
Goal			
TAp	6.87 (.34)$_a$***	1.90 (.79)$_b$	1.39 (.60)$_b$
SAp	1.69 (.86)$_b$	6.92 (.35)$_a$***	1.39 (.64)$_b$
OAp	1.41 (.68)$_b$	1.41 (.82)$_b$	6.86 (.35)$_a$***
	Context		
	AS	Con	
Context			
AS	6.62 (.46) $_a$***	1.46 (.53) $_b$	
Con	1.48 (.63) $_b$	6.44 (.48) $_a$***	

Notes. Subscript letters represent statistically significant differences between conditions. Rows that share the same subscript letter, do not differ significantly. TAp = task-approach; SAp = self-approach; OAp = other-approach; AS = autonomy-supportive; Con = controlling.
***$p < .001$.

they had been allocated. Secondly, a series of one-way ANOVA's confirmed that our intended TAp ($F_{(2, 111)} = 964.04$, $p < .001$, $\eta^2 = 0.95$), SAp ($F_{(2, 111)} = 866.17$, $p < .001$, $\eta^2 = 0.94$), and OAp ($F_{(2, 111)} = 860.96$, $p < .001$, $\eta^2 = 0.94$) goal manipulations had been successful (see Table 1). Thirdly, a MANOVA confirmed the effectiveness of our autonomy-support ($F_{(1, 112)} = 3080.13$, $p < .001$, $\eta^2 = 0.97$) and controlling context ($F_{(1, 112)} = 2207.53$, $p < .001$, $\eta^2 = 0.95$) manipulations (see also Table 1).

3.2. Descriptive statistics

Tables 2-4 presents the descriptive statistics for indices of physiological and psychological functioning, and performance. The measures employed to capture indices of psychological functioning exhibited relatively high levels of internal reliability (α = 0.70 - 0.89), with the exception of the challenge appraisal subscale (α = 0.47). A problematic item (i.e., "I am thinking about what it will be like if I do well in this task") was removed and resulted in the measure reaching an acceptable level of internal consistency (α = 0.70).

3.3. Main analyses

3.3.1. Achievement goals and motivational context effects on psychophysiological functioning and performance

Physiological Functioning. A series of 3 × 2 x 4 (Goal [TAp/SAp/OAp] x Context [autonomy-supportive, controlling] x Time [T1, T2, T3, & T4]) mixed-design ANOVAs were conducted to examine effects on cardiovascular reactivity (indexed by HR, systolic, and diastolic BP). A significant two-way interaction emerged for the effects of goal and time on diastolic BP, $F_{(6, 324)} = 2.18$, $p = .044$, $\eta^2 = 0.06$. Closer inspection of the interaction revealed that those participants in the OAp goal group ($M = 70.19$, $SD = 10.36$) had a significantly ($p < .05$) higher diastolic BP recording than those in the SAp (M = 65.54, SD = 7.39) goal group only at T4. No further main or interaction effects emerged.

There were also significant two-way effects between context and time on HR, $F_{(3, 324)} = 8.88$, $p < .001$, $\eta^2 = 0.16$ and systolic BP, $F_{(3, 324)} = 3.92$, $p = .012$, $\eta^2 = 0.07$. Specifically, statistically significant differences (all p's < 0.05) on HR (Con: $M = 87.42$, $SD = 14.95$ vs. A-S: $M = 80.88$, $SD = 12.92$): and systolic BP (Con.: $M = 115.81$, $SD = 14.39$; A-S: $M = 110.25$, $SD = 15.21$) only emerged at T4, with controlling conditions recording a significantly higher HR and systolic BP than their autonomy-supportive counterparts.

Psychological functioning. A series of 3 × 2 (Goal x Context) ANOVAs were conducted on stress appraisals, anxiety, task enjoyment and perceived competence. A significant interaction, $F_{(2, 108)} = 3.73$, $p = .027$, $\eta^2 = 0.07$, revealed that participants in the TAp-Con condition ($M = 1.96$, $SD = 0.98$) appraised the shooting task as significantly more threatening ($p < .05$) than their counterparts in the TAp-AS condition ($M = 1.29$; $SD = 0.50$). Subsequent findings revealed only main goal effects for challenge appraisals, $F_{(2, 108)} = 4.33$, $p = .015$, $\eta^2 = 0.07$, cognitive anxiety, $F_{(2, 108)} = 7.37$, $p = .001$, $\eta^2 = 0.12$, somatic anxiety, $F_{(2, 108)} = 4.95$, $p = .009$, $\eta^2 = 0.08$ and perceptions of competence, $F_{(2, 108)} = 3.02$, $p = .05$, $\eta^2 = 0.05$. As can be seen in Table 5, the findings show the TAp goal group reported significantly lower cognitive anxiety ($p = .001$), somatic anxiety ($p = .007$) and higher perceptions of competence ($p = .04$) than the OAp goal group only. Furthermore, the OAp group recorded significantly ($p = .02$) higher challenge appraisals ($M = 6.06$, SD = 0.76) than the TAp goal ($M = 5.62$, $SD = 0.53$) condition only. No other significant findings emerged ($p > .05$).

Performance. A 3 × 2 x 2 repeated measures ANOVA was utilized to examine the effects of goal, context and time on pre and post-task

Table 2
Descriptive Statistics for indices of Physiological Functioning across the Six Experimental Conditions.

Variables	Experimental Conditions					
	TAp		SAp		OAp	
	AS	Con	AS	Con	AS	Con
Heart Rate						
T1	70.05 (11.65)	70.74 (10.85)	68.58 (12.19)	65.35 (12.15)	69.72 (9.57)	73.89 (11.59)
T2	82.30 (14.56)	83.47 (14.53)	78.42 (10.42)	80.60 (12.92)	81.67 (13.68)	86.72 (12.61)
T3	76.85 (11.96)	79.74 (12.83)	75.89 (12.91)	76.80 (14.63)	79.22 (11.40)	82.33 (12.67)
T4	82.70 (14.46)	87.32 (15.29)	78.05 (9.38)	82.95 (14.88)	81.83 (14.46)	92.50 (13.80)
Blood Pressure						
Systolic						
T1	122.30 (17.57)	114.58 (11.00)	108.37 (16.52)	116.05 (17.75)	111.78 (20.64)	112.28 (15.08)
T2	115.75 (15.35)	115.42 (14.12)	107.84 (12.98)	115.40 (19.36)	111.39 (17.72)	114.72 (12.89)
T3	111.45 (12.05)	111.32 (14.00)	103.21 (13.55)	110.60 (18.98)	107.33 (19.03)	112.28 (14.88)
T4	114.20 (14.50)	116.84 (13.27)	105.37 (14.42)	115.45 (15.78)	111.00 (16.17)	115.11 (14.69)
Diastolic						
T1	73.55 (9.11)	69.58 (7.25)	66.95 (9.33)	70.95 (9.89)	72.17 (8.72)	70.56 (9.15)
T2	69.55 (6.72)	66.42 (7.83)	66.21 (9.17)	68.90 (11.07)	71.67 (8.13)	69.94 (10.44)
T3	91.00 (6.29)	66.16 (7.10)	67.79 (8.07)	68.85 (7.32)	70.50 (9.06)	70.61 (10.85)
T4	71.05 (6.20)	67.11 (6.58)	63.53 (7.38)	67.55 (7.02)	69.50 (9.15)	70.89 (11.67)

Notes. TAp = task-approach; SAp = self-approach; OAp = other-approach; AS = autonomy-supportive; Con = controlling.

Table 3
Descriptive statistics for indices of psychological functioning across the six experimental conditions.

Variables	Experimental Conditions					
	TAp		SAp		OAp	
	AS	Con	AS	Con	AS	Con
Appraisals						
Challenge	5.74 (.53)	5.50 (.51)	5.96 (.77)	5.96 (.70)	6.11 (.48)	6.00 (.97)
Threat	1.29 (.50)	1.96 (.98)	1.50 (.52)	1.44 (.64)	1.93 (.81)	1.79 (.76)
Anxiety						
Cognitive	2.29 (1.14)	3.47 (1.23)	3.50 (1.17)	3.46 (1.43)	3.98 (1.22)	4.12 (1.66)
Somatic	2.59 (.58)	3.00 (.96)	2.93 (.70)	3.03 (.73)	3.33 (.57)	3.40 (1.09)
Enjoyment	5.81 (1.02)	5.22 (.92)	5.21 (1.07)	5.39 (1.21)	5.11 (.74)	4.74 (1.62)
Competence	3.67 (.94)	3.23 (1.22)	2.72 (1.24)	3.17 (1.58)	2.69 (1.37)	2.86 (1.04)

Notes. All study variables were measure along 7-point-likert scales. TAp = task-approach; SAp = self-approach; OAp = other-approach; AS = autonomy-supportive; Con = controlling.

Table 4
Descriptive statistics for the six experimental conditions for goal attainment and performance.

Variables	Experimental Conditions					
	TAp		SAp		OAp	
	AS	Con	AS	Con	AS	Con
Goal Attainment	4.50 (.89)	3.68 (1.29)	3.37 (1.92)	3.75 (2.05)	2.72 (1.45)	2.89 (1.49)
Points Scored						
Trial 1	25.70 (11.03)	25.84 (6.96)	29.11 (5.74)	28.40 (7.98)	26.67 (4.80)	27.11 (6.29)
Trial 2	29.80 (8.54)	23.47 (9.19)	32.79 (4.79)	29.80 (6.44)	28.11 (4.35)	30.06 (5.77)
95%CI [LL, UL]						
Trial 1	TAp goal; [23.40, 28.15]		SAp goal; [26.38, 31.13]		OAp goal; [23.92, 28.87]	
95%CI [LL, UL]						
Trial 2	TAp goal; [24.28, 28.80]		SAp goal; [29.14, 33.45]		OAp goal; [26.84, 31.33]	

Note. TAp = task-approach; SAp = self-approach; OAp = other-approach; AS = autonomy-supportive; Con = controlling; CI = confidence interval.

Table 5
Main effects of goal condition on indicators of psychological functioning.

Variables	Experimental Manipulations		
	Goal		
	TAp	SAp	OAp
Challenge Appraisals	5.62 (.53)$_b$	5.96 (.73)	6.06 (.76)$_a$*
Threat Appraisals	1.62 (.83)	1.47 (.58)	1.86 (.78)
Cognitive Anxiety	2.87 (1.31)$_a$*	3.48 (1.29)	4.05 (1.44)$_b$
Somatic Anxiety	2.79 (.80)$_a$**	2.98 (.70)	3.36 (.86)$_b$
Competence	3.46 (1.10)$_a$*	2.95 (1.43)	2.77 (1.20)$_b$
Enjoyment	5.52 (1.01)	5.30 (1.13)	4.93 (1.26)

Note. Different subscript letters represent significant differences between conditions. TAp = task-approach; SAp = self-approach; OAp = other-approach. *$p < .05$; **$p < .01$.

performance. The findings revealed a significant interaction, for the effect of context and time on performance, $F\ (_{1,\ 108}) = 4.69$, $p = .03$, $\eta^2 = 0.04$. Specifically, participants under an autonomy-supportive context, regardless of approach goal followed, significantly ($p < .001$) improved their performance from pre- ($M = 26.82$, $SD = 7.84$) to post-shooting ($M = 30.26$, $SD = 6.45$) task. Additionally, a significant main effect of goal was observed, $F\ (_{2,\ 108}) = 3.63$, $p = .03$, $\eta^2 = 0.06$, demonstrating that those participants pursuing a SAp goal ($M = 31.26$, $SD = 5.82$) significantly ($p = .03$) outperformed their counterparts in the TAp goal condition ($M = 26.72$, $SD = 9.31$) on the second trial of the shooting task. There were no significant differences ($p > .05$) in performance between the SAp and OAp goal groups.

Finally, a 3 × 2 (Goal x Context) ANOVA on goal attainment was conducted. The findings revealed a significant main effect for goal only, $F\ (_{2,\ 108}) = 6.36$, $p = .002$, $\eta^2 = 0.11$. Specifically, participants performing within a TAp goal condition reported higher goal attainment ($M = 4.10$, $SD = 1.17$) than those pursuing an OAp goal ($M = 2.81$, $SD = 1.45$). The analyses revealed no other significant findings for goal attainment ($p > .05$).

4. Discussion

Based on the arguments of Vansteenkiste, Lens, et al. (2014) and Vansteenkiste, Mouratidis, et al. (2014), our experimental work tested the potential interactive effects of approach-based achievement goals and the motivational context on the psycho-physiological functioning and performance of novice basketball players. More specifically, we investigated if TAp, SAp and OAp goals induced under autonomy-supportive and controlling motivational contexts differentially impacted participants' cardiovascular reactivity, psychological well-being and motor skill performance. Our findings revealed limited support for the integration of the HMAM (Elliot et al., 2011) with SDT (Ryan & Deci, 2000) in a sport setting. Instead, our findings demonstrated evidence for the unique effects of approach-based goals and the motivational context in explaining the physiological and psychological functioning of performers executing a novel sports task.

4.1. Physiological functioning

Within the context of this study, a primary interest was in participants' physiological responses to a potentially stressful situation (i.e., attempting to demonstrate successful performance of a motor task), which served as an indicator of (sub)optimal functioning. In an attempt to advance the extant literature integrating the HMAM with SDT (e.g., Delrue et al., 2016; Vansteenkiste et al., 2010), our findings provide interesting new insights with respect to CV reactivity. Partially supporting our first hypothesis (1a), results revealed that participants pursuing an OAp goal recorded a significantly higher spike in their diastolic BP at T4 compared to a SAp goal. It has been theoretically proposed and subsequently supported in research that individuals focused on approach goals, particularly those in pursuit of a SAp goal, are more likely to view a demanding and potentially stressful event positively. This has resulted in individuals exerting physiological patterns in line with a challenge state (i.e., an increase in cardiac activity along with a decrease in peripheral vascular resistance; Jones et al., 2009). However, the relationship between OAp goals and a challenge state are

less clear. Within our study, OAp goal pursuit produced a significant increase in diastolic BP (compared with SAp goals) at T4, a pattern indicative of a physiological response to a threat. This provides an original contribution to the existing sport-motivation literature, which more typically reports similar findings coming from self-report measures only (i.e., cognitive appraisals of stress [e.g., Adie et al., 2008]). As the definition of OAp goals concerns outperforming fellow competitors, it is suggested that this condition may be interpreted as threatening as participants were all basketball novices.

Secondly, in support of our third hypothesis (3a), it was evident participants performing under a controlling (compared to autonomy-supportive) context experienced significantly increased HR and systolic BP levels at T4, posing a compromise to their healthy physiological functioning. The facets of a controlled environment (i.e., external pressures, controlling language, intimidation techniques and a lack of personal endorsement), are theoretically known and found to thwart satisfaction of the three basic psychological needs (autonomy, competence, and relatedness) and undermine autonomous regulation and well-being in sport (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011). As demonstrated in our findings, a controlling context elicits a stress response, represented by a physiological pattern indicative of threat, and it seems reasonable to suggest this occurs because of frustration of the basic psychological needs. However, it is important to clarify, no measure of basic psychological needs was employed within this study design, and so this presents a fruitful opportunity for future researchers to explore further.

Our novel findings suggest potentially harmful consequences of a controlling environment and, separate to this, OAp goal pursuit towards an achievement task, on CV reactivity. They are, however, in line with a host of previous research reporting the maladaptive nature of controlled motivation on psychological functioning (e.g., Bartholomew et al., 2009; Vansteenkiste et al., 2010) as well as the potential disadvantages of OAp goal pursuit (for a review see Papaioannou et al., 2012). Researchers should seek to replicate these findings within an alternative sport context to enhance our understanding of the individual and (potential) goal complex effects and their relationship with indices of physiological functioning.

4.2. Psychological functioning

Inconsistent with our first (1b) and second hypothesis, our findings revealed that pursuit of a TAp goal under a controlling context is most problematic; participants in this condition appraised the task as significantly more threatening than their autonomy-supportive counterparts, shedding new light on the potential for AGT-SDT integration. This finding indicates that participants focused on striving to develop skill and task mastery (i.e., TAp goal adoption) are more vulnerable to viewing performance as a threat when pursuing this type of goal under a controlling context relative to autonomy-supportive. One explanation may concern participants under the controlling condition were worried about meeting their goal on the basis that they felt compelled to learn the task, and because they were under the impression they were being timed and evaluated; these conditions were not conducive to learning and/or skill development which is a key referent for success in a TAp goal condition. Additionally, participants were basketball novices and so to feel time-pressured into pursuing a single goal where their referent is to develop skill mastery, may well account for these increased perceptions of threat regarding their task performance. In the autonomy-supportive condition, participants not only endorsed the goal but were also provided with free time to recall the demonstration and technique used to perform the task, and thus, deemed the achievement situation to be less threatening than their controlled counterparts.

Regarding our main goal effects, as expected, our findings suggest that pursuit of a TAp goal will result in lower cognitive and somatic anxiety and higher perceptions of competence when compared to an OAp goal, indicating its salience for optimal functioning. Achievement goal researchers have reported when in pursuit of a task-goal, individuals devote attentional resources to the inherent aspects of the activity, rather than adopt a normative standard for competence evaluation, as when in pursuit of OAp goals (Spray et al., 2006). Focusing on the inherent components of a skill can facilitate optimal functioning particularly with respect to novel tasks (Spray et al., 2006). Our findings are in line with previous research that has also reported similar findings for the psychological benefits of TAp goal pursuit (Elliot et al., 2011).

Inconsistent with our expectations (hypothesis 1b), OAp goal conditions recorded significantly higher challenge appraisals than the TAp groups. On reflection, the relation of OAp goal pursuit with challenge appraisals is not surprising considering: 1) our appraisal measure included items directly focused on performance, for which OAp goals, by definition, are a key predictor, and 2) the debate in early literature surrounding the (mal)adaptive nature of these goals. Previous research across differing achievement domains have also found similar links (Adie et al., 2008; McGregor & Elliot, 2002). However, within our study, despite approaching the task with a positive outlook, these individuals pursuing an OAp goal still experienced the highest cognitive and somatic anxiety throughout their performance, and afterwards, perceived themselves to be least competent, in comparison with the TAp goal group. As active sports participants, it is reasonable to suggest that our population sample in pursuit of an OAp goal naturally viewed this novel competitive task as positive and as an opportunity for personal growth. However, this finding should be interpreted with caution.

Incongruent with our hypothesis (1b), we did not find any statistically significant findings to indicate that TAp and SAp goal pursuit would lead to a more enjoyable experience than those performing under an OAp condition. Previous literature has often reported positive associations between MAp goals and enjoyment in sport (e.g., Vansteenkiste, Lens, et al., 2014) and across other achievement domains such as education (e.g., Benita et al., 2014). However, in such studies, the population sample used has been in line with the task performed (i.e., in Vansteenkiste, Mouratidis et al., [2014], researchers followed volleyball players over the course of their competitive season whilst Benita et al., [2014] used college students to complete an educational task). As a result of their natural interest and investment in the activity, participants in these studies also demonstrated enhanced engagement, leading to greater levels of enjoyment during performance. Although we recruited competitive adult sport participants, our criteria also stipulated basketball novices and as a result, it is plausible that none of our participants had an inherent passion for or affiliation to the sport, which may explain why we found no goal-context influence on task enjoyment. Furthermore, from a conceptual viewpoint, these studies framed their investigations within the early models of AGT (e.g., Elliot & McGregor, 2001), exploring an omnibus MAp goal. Therefore, these studies do not exclusively differentiate between the self and task competence components and their individual contributions as highlighted by the 3 × 2 AGM (Elliot et al., 2011), meaning their goal measure/manipulations may have been capturing different constructs. This makes drawing comparisons in our results and those reported in prior studies difficult.

4.3. Performance

As hypothesized (3c), our findings showed individuals pursuing approach-based goals within an autonomy-supportive environment significantly improved their shooting pre-to post-performance. Thus, the results show that the type of approach-based goal did not influence performance under this condition if they assimilated its value. In line with other sport research (Hooyman et al., 2014; Reinboth et al., 2004; Spray et al., 2006) our findings highlight the importance of providing choice and a rationale for goal-directed achievement behavior. Additionally, in agreement with most of the existing literature (Delrue et al., 2016; Lochbaum & Gottardy, 2015; Spray et al., 2006) we found

support for the adaptive nature of SAp (relative to TAp) goals on performance indicators, as participants recorded a significantly higher score on the shooting task. This finding is not surprising as SAp goals are more focussed on self-referenced success (i.e., task improvement), compared to TAp goals which place emphasis on task mastery. These findings firstly demonstrate the importance of splitting this former MAp goal into separate competence referents (Elliot et al., 2011), at least when considering influences on performance indices. Secondly, although they remain an understudied goal, research has identified the potential prominence and importance of a SAp goal among sport participants (Delrue et al., 2016) considering that improving upon previous performance is a key factor influencing motivational processes and our findings lend support to this claim. Next, contrary to our hypothesis (1c), we did not observe any significant performance decrements of participants in pursuit of OAp goals, relative to SAp and TAp goal pursuits. This was initially tentatively hypothesized based on the history of equivocal findings surrounding OAp goal pursuit. However, on reflection, the findings from the present study align with existing sport-motivation literature that has tested a similar concept, which commonly reports the equal or adaptive nature of OAp goal pursuit (relative to SAp and TAp goals) on performance (e.g., Kavussanu et al., 2009; Lochbaum & Gottardy, 2015). In considering the definition of OAp goals (i.e., having a positive focus on achieving success by striving to outperform others) alongside the inherent competitive nature associated with our participant sample, it thus seems reasonable to suggest that those with a quest to obtain normative success can indeed perform to at least a similar level as those in pursuit of SAp and TAp goals. To be clear, it appears despite the adaptive links with performance, the potential issues arise surrounding long-term pursuit of OAp goals, which have been revealed to be health-compromising (e.g., Adie et al., 2010).

Additionally, we observed individuals in pursuit of TAp goals within our study reported comparatively higher perceptions of goal attainment relative to participants adopting an OAp goal (although we did not observe any significant interaction or main effects). This finding is of interest, firstly because TAp goal participants recorded the poorest shooting performance and secondly, considering our earlier goal-context interaction on cognitive appraisals (i.e., individuals performing within the TAp-Con condition appraised the task as most threatening). This could be explained in terms of how performance referents were differentially measured. In pursuit of OAp goals, participants were instructed to score at least 13 baskets, however, we additionally employed a scoring system based on point allocation from 0 to 3 (see measures section), thus performance was not measured by absolute scores. Alternatively, goal attainment was assessed in relation to feeling a sense of mastery. To elaborate further, within our study design, TAp goal participants were exposed to a short video demonstration of how the basketball set-shot skill should be performed but had limited to no experience regarding the kinesthetics of the movement pattern or sport-specific knowledge of how to translate the demonstrated technique accurately into their performance as they were novices (McMorris, 2004). Without this expertise, it is likely TAp goal participants assumed they adequately replicated the three-step technique execution, resulting in their relatively high goal attainment reports – their goal focus after all was on mastery of the set-shot skill, not shooting accuracy. Furthermore, despite feeling pressured and threatened by the task within a controlling motivational context, generally TAp participants still perceive themselves to have performed adequately towards achieving their allocated goal.

4.4. Practical recommendations

Our results suggest it is imperative practitioners independently consider both the type of goal and the environment they create for their athlete's goal pursuit in order to encourage optimal physiological functioning, especially immediately post-performance. Specifically, mastery-based goal pursuit, particularly SAp goals and separately, an autonomy-supportive context can ensure a more regulated physiological pattern, avoiding any short- and long-term maladaptive consequences (i.e., stress, dropout) that may negatively impact well-being and performance (Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani, 2011).

Regarding psychological functioning, practitioners should be aware that although it appears there are immediate benefits pre-performance of OAp goal pursuit in terms of perceiving the task as a challenge, there also exists hidden costs post-performance. Our findings suggest heightened anxiety (an indicator of ill-being) coupled with low perceptions of competence are related to OAp goal pursuit and previous research has documented that in both the immediate and long-term, these factors are (potentially) detrimental to an individuals' psychological functioning (Adie et al., 2010; Reinboth & Duda, 2004). Therefore, practitioners should consider the promotion of TAp goals for experiences of enhanced psychological functioning with specific reference to anxiety reduction and enhancing perceived competence.

Based upon the current study findings, we suggest practitioners seeking performance benefits from sports participants should consider creating an autonomy-supportive context, whereby individuals feel supported in their actions, valued in offering their opinions and understand the rationale underpinning behavior engagement (i.e., why it is important). In addition, practitioners should also consider the specific goal to promote, especially when working with individuals approaching a novel task situation. SAp (relative to TAp) goal pursuit, yields an immediate performance benefit which is encouraging although future research should seek to replicate these initial findings over an extended time-frame to explore the potential long-term effects.

Although our study failed to support most goal-context interactive effects (except for one goal-context interaction, [i.e., TAp goal-controlling context on stress appraisals]), recommendations can still be made for practitioners to consider when operating within the applied sporting environment. It is suggested for sports participants to experience long-term enhanced psycho-physiological functioning and performance benefits, coaches should promote approach-based goals (specifically TAp and SAp) within an autonomy-supportive environment (i.e., utilizing positive and encouraging language, offering choice and rationale whilst ensuring the individual plays an active role in the decision-making process).

4.5. Additional limitations and future directions

Despite being one of the first studies to experimentally test the integration of AGT and SDT (see also Spray et al., 2006) in sport, our findings have several limitations. First, our work only drew upon the effects of approach-based goals (TAp, SAp, and OAp) as part of the 3 × 2 AGM (Elliot et al., 2011). An alternative approach could be to ascertain if the approach-avoidance dimension of each goal investigated separately under different motivational contexts influences psychological well-being and physical markers of health in sport. It is suggested this could be particularly relevant to the other-based goals (i.e., OAp and other-avoidance [OAv] goals), especially considering the historically equivocal findings surrounding the OAp goal and its utility in achieving optimal performance and functioning (Elliot & Moller, 2003). This line of inquiry may also be interesting to enhance understanding of other-goal contrasts given they have reported a large effect on performance in the literature (Lochbaum & Gottardy, 2015). For example, future research could examine what happens to performance (and well-being) when absolute differences of endorsing OAp more than OAv goals are considered under autonomous and controlled contexts. Secondly, we did not directly measure participant's underlying reasons for achievement goal pursuit. Similar to other research (Benita et al., 2017) we assumed that because of our context manipulations, participants regulated their goal for either autonomous or controlling reasons. Current literature has yet to explore and measure both the contexts and reasons underpinning goal adoption in a sport setting and so this would

be a valuable avenue for future research. On this note, a third limitation involves the multidimensional manipulation of autonomy-supportive (e.g., providing a choice, acknowledging difficulties and using non-controlling language) and controlling (e.g., pressuring language, excessive personal control and inducing threats) motivational contexts. Thus, we cannot provide clarity on which dimension(s) were responsible for the positive and negative effects of autonomy-support and control respectively. Fourth, there may be alternative indicators of physiological functioning, particularly in response to stress, future research could consider. For example, skin conductance and respiration or immunological indicators such as cortisol and secretory immunoglobulin A (S-IgA) may be particularly informative regarding potential mechanisms through which social-psychological processes differentially impact an individual's healthy functioning. Similarly there could be other indices of psychological functioning to account for, more salient to this type of design (considering our population sample and task set-up) that we did not consider and additionally, other mediators (e.g., measures of need satisfaction, could be included as the three basic needs are viewed as playing a significant role in mediating achievement goal approach and the social environment with well-/ill-being; Adie et al., 2008, 2010). Finally, this research was confined to a laboratory environment using novice athletes. Although it is important to clarify our intended focus was on testing theoretical principles and the integration of two prominent frameworks of motivation in understanding psycho-physiological functioning and performance in an achievement situation rather than investigating applied practice. Nevertheless, a question exists concerning ecological validity and to what extent of our findings can be generalized beyond sport performers invested in a novel motor skill. Future research may consider replicating our experimental findings with a large, sport-specific sample performing a real rather than simulated achievement task and for a longer duration of time. In doing so, participants would be performing within their natural environment where they have developed a deep and purposeful connection to their chosen sport, consequently resulting in enhanced task engagement (Benita et al., 2014).

5. Conclusion

In summary, this work extends a recent line of research seeking to explore how the integration of tenets of the 3 × 2 AGM (Elliot et al., 2011) and SDT (Deci & Ryan, 1985) interact to influence psycho-physiological functioning and performance outcomes. Contrary to most of the sport-based correlational literature investigating the integration of these prominent motivation theories, our experimental findings suggest it may be more fruitful to employ these two frameworks separately. Our findings also point towards considering the effects of different types of approach-based achievement goal pursuits on indices of psycho-physiological functioning and performance. In that respect, our findings provide further support for the separation of the former mastery goal, into self- and task-referents, at least with regards to approach-based goal pursuit within the 3 × 2 AGM (Elliot et al., 2011). Likewise, it was revealed the motivational context created can itself directly impact psycho-physiological functioning and performance. Whilst there were no adaptive consequences reported across variables measured for the combined goal and context effects, there was evidence to suggest when goal-context interactions are maladaptive for psychological functioning (i.e., pursuit of a TAp goal under a controlling context will result in individuals appraising the task as significantly more threatening than those performing within an autonomy-supportive environment). To reiterate, this is, to the best of our knowledge, the first experiment to test the influence of the motivational context underpinning the adoption of the three-approach goals simultaneously. The examination of individuals' physiological well-being using objective measures is also an original contribution to the AGT-SDT literature. Taking this into consideration, further experimental replication of our work is necessary before drawing firm conclusions or practical implications regarding the consequences of integrating these two motivational frameworks within sport.

CRediT authorship contribution statement

Mairi Mulvenna: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft, Writing - review & editing, Visualization. **James W. Adie:** Supervision, Conceptualization, Methodology, Formal analysis, Writing - review & editing. **Luke D. Sage:** Supervision, Conceptualization, Methodology, Formal analysis, Writing - review & editing. **Nigel E. Wilson:** Conceptualization, Methodology. **Douglas Howat:** Conceptualization, Methodology.

Declaration of competing interest

My co-authors and I do not have any interests that might be interpreted as influencing the research. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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