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Athletic identity and autonomous motivation as predictors of endurance performance during high intensity exercise☆

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ABSTRACT

Purpose: The aims of the present study were a) to develop and test a within-person experimental manipulation of athletic identity salience and autonomous motivation in endurance contexts, and b) to examine whether athletic identity or autonomous motivation better predicted endurance performance via the desire to reduce effort and the value of the performance goal.

Methods: Thirty-seven participants (24 males, 13 females, 20–27 years old) from a sports background completed a brief performance profile activity to identify and evaluate personal characteristics that would help during an endurance task (experimental condition) or described how they maintained close relationships (control condition). After completing measures of athletic identity and autonomous motivation, participants then completed an incrementally difficult cycling test until voluntary termination. The intensity of the test increased every 150 s, with measures of desire to reduce effort and performance goal value taken during each stage.

Results: Multilevel modelling revealed that the experimental manipulation enhanced the salience of athletic identity ($b = 05$, $p = .005$), but did not change autonomous motivation ($b = .05$, $p = .21$). However, differences in endurance performance were explained by within-person changes in autonomous motivation ($b = 31.02$, $p < .001$), but not athletic identity ($b = -5.34$, $p = .58$). This direct effect was partially mediated by smaller decreases in the value of the performance goal ($z = 3.45$, $p < .001$).

Conclusion: A modified performance profile is useful to experimentally manipulate the salience of athletic identity in endurance contexts. Autonomous motivation enhances endurance performance by minimising reductions in the motivational value of the performance goal.

1. Introduction

The capacity to persist despite physiological or psychological difficulty is an essential ingredient for success in sport and many other contexts. Athletes seldom reach physiological limits during tests of endurance, which underscores the importance of motivational and decisional factors in explaining partial (i.e., reduction of effort) or complete disengagement from endurance activity (Marcora & Staiano, 2010a, 2010b). Adopting this perspective, a framework based on the conflict between the desire to reduce effort and the motivating performance goal has been proposed to meaningfully explain performance in endurance tasks (Taylor, 2021). This motivational model of endurance is underpinned by the idea that endurance is largely based on the ability to persist despite aversive physical and psychological states. For instance, affective responses to exercise are increasingly negative as lactate begins to accumulate in the blood (Ekkekakis et al., 2011). This state will provoke a *desire to reduce effort* aimed at reestablishing homeostasis (St Clair Gibson et al., 2018) because the perceived opportunity costs of continuing are excessive (Kurzban et al., 2013). This hedonic desire competes with a more distal, reflective *performance goal*. The content (e.g., winning a race, achieving a certain time, or completing a training exercise) and orientation (e.g., self-versus normative-referenced; cf. Roberts & Nerstad, 2020) of these goals may vary, however, in this framework it is the motivational value (i.e., magnitude) that determines endurance performance. The clash between the avoidance-oriented desire and approach-oriented performance goal implies that the generalizable principle of a *desire-goal conflict* frequently described within the self-regulation literature (Kotabe & Hofmann, 2015) is, therefore, a

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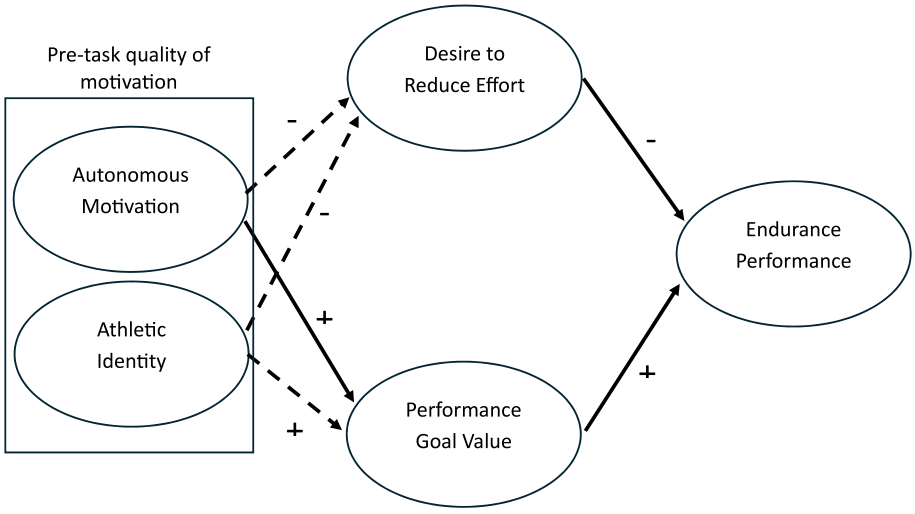
central element of endurance performance (see Fig. 1 for an overview of the motivational model).

The desire to reduce effort and performance goal value are dynamic and possess distinct trajectories during endurance activities. For example, the desire to reduce effort increases exponentially over the course of an increasingly difficult endurance trial, whereas changes in performance goal value are more notable in later stages (Taylor et al., 2022). Differences in desire and goal trends are also able to meaningfully explain endurance capabilities. For example, lower desire to reduce effort at the beginning of the trial and a slower reduction in goal value across the trial were found to be characteristic of relatively higher (versus poorer) performers (Taylor et al., 2020). Additionally, faster increases in the desire to reduce effort and faster decreases in the performance goal value were observed in untrained participants, compared to experienced cyclists (Wellings et al., 2024).

These trends are proposed to be underpinned by the quality of motivation towards an endurance task prior to its initiation (Taylor, 2021). From this perspective, pre-task motivation is not seen to be the amount of effort an individual is willing to exert to resolve the desire-goal conflict (Kotabe & Hofmann, 2015) or employ on the task itself (Marcora, 2010). Instead, pre-task motivation concerns the degree to which engagement in the endurance act is compatible with the athlete's sense of self. This idea is informed by several theories. For example, the identity-value model (Berkman et al., 2017) suggests that greater congruence between a task and one's identity will lead to greater persistence. In athletic contexts, identity is defined as "the degree to which an individual identifies with the athlete role" (Brewer et al., 1993, p. 237). Identity-related goals are motivationally superordinate compared to other goals, such as goals aimed at 'doing' or 'having'. As such, identity-based goals are often the most valued and durable goals individuals possess (Carver & Scheier, 1998). Increases in the salience of athletic identity in reference to an athletic task may, therefore, enhance endurance performance. Within the self-determination meta-theory, organismic integration theory (OIT; Ryan & Deci, 2017) similarly proposes that when an individual is autonomously motivated, which refers to congruence between an activity and one's sense of self, greater persistence occurs. Nonetheless, prior to the development of the motivational model of endurance, very little OIT-informed evidence of this relationship existed. Indeed, Mouratidis et al. (2008; study 1) found no relationship between autonomous motivation and endurance performance on a shuttle run test, although this study was conducted on children.

In an optimally motivated state, the desire to decrease effort during the endurance act is alien to core values that reflect one's identity. This cognitive dissonance is required to be resolved (Harmon-Jones & Mills, 2019); hence, a lower motivational value will be allocated to the desire. In contrast, an optimally motivated stated leads the performance goal to be congruent with core identity-based values, which is reflected in easier activation (Werner et al., 2016) and enhanced motivational value of the endurance goal. This optimal pre-task motivation will, therefore, produce superior endurance performance via diminished desire to reduce effort and greater value of the performance goal. These processes have been empirically supported using self-paced time trials (Taylor et al., 2020). In a first study, pre-task autonomous motivation was negatively associated with the initial levels and increases in desire to reduce effort over the course of the trial, as well as positively associated with initial performance goal values. A second study found indirect effects of autonomous pre-task motivation on endurance performance via reduced desire to reduce effort and increased performance goal value.

The present study methodologically and conceptually builds on this previous work. To strengthen the evidence base underpinning the motivational framework, it was necessary to develop a within-person experimental protocol that can manipulate pre-task motivation towards an endurance task. The protocol was designed with the theories mentioned above in mind; hence, we focused on enhancing the salience of athletic identity and autonomous motivation. Such a protocol does not exist to manipulate the extent that athletic identity is made salient, which prevents any experimental work being conducted on this important motivational variable. In SDT-research, autonomous motivation is typically manipulated in interventions by providing autonomy support. However, these approaches are relatively resource intensive with training typically required for the provider of autonomy support (e.g., Fenton et al., 2021). Classic SDT-based experiments manipulated autonomous motivation by the experimenter providing a meaningful rationale, choice, and acknowledging negative feeling (Deci et al., 1994). Rather than relying on others to *provide* autonomy support, we



Note. A third indirect pathway is hypothesized in the full model via emotional regulation but was not examined in the present study. Autonomous motivation and athletic identity were used interchangeably in previous research but were examined separately in the present study. Dashed lines indicate relationships not evidenced in the present study

Fig. 1. A motivational model of endurance performance. A third indirect pathway is hypothesized in the full model via emotional regulation but was not examined in the present study. Autonomous motivation and athletic identity were used interchangeably in previous research but were examined separately in the present study. Dashed lines indicate relationships not evidenced in the present study.

sought to develop a protocol that allowed participants to be autonomous without significant support. Other laboratory experiments have given participants perceived (but bogus) choice in the tasks that they undertook (Legault & Inzlicht, 2013; Steel et al., 2021). The bogus element, however, makes it difficult to transfer this protocol to within-person experiments.

Experimental work has employed writing tasks to manipulate self-construals, which refer to the way an individual understands oneself in relation to other people (Pilarska, 2014). For example, participants have been required to write about why they maintained good physical health in increasingly abstract and identity-relevant terms (Fujita et al., 2006). We combined this idea of using writing tasks to enhance the salience of one's identity with performance profiling, a tool commonly employed by sport psychologists to help athletes identify characteristics and abilities associated with success in their given sport (Gucciardi & Gordon, 2009; Bird et al., 2020). This technique has been theoretically and empirically associated with enhanced autonomous motivation and focused attention on the self (Butler & Hardy, 1992; Castillo & Chow, 2020; Chow et al., 2019; Weston et al., 2013). Indeed, Butler and Hardy (1992) emphasized self-determination theory in justifying the usefulness of performance profiling because it fosters autonomous motivation via the satisfaction of psychological needs for autonomy, competence, and relatedness. This type of activity could, therefore, enhance autonomous motivation and the salience of the self in an athletic experimental setting.

The second focus of the present study was to clarify a theoretical vagueness resulting from attempts to integrate different perspectives. When defining pre-task motivational quality, previous work interchangeably uses the terms autonomous motivation and identity as the motivational basis of endurance. For example, Taylor (2021) explains how the extent that the endurance act is aligned with the athlete's *identity* can lead to predictable levels of desire to reduce effort and performance goal value. In the same article, pre-task motivational quality is described in line with classic definitions of autonomous motivation. This interchangeable use of the two terms also exists in laboratory studies, even though the measure employed reflects autonomous motivation (Taylor et al., 2020, 2022). While the constructs have some similarity, they are not identical. Identities can vary in their congruence with the self and the extent to which they are experienced autonomously (Soenens & Vansteenkiste, 2011). This stance is supported by modest correlations between athletic identity and autonomous motivation (e.g. Reifsteck et al., 2016). As a result, it is possible that previous work in this area is committing a 'jangle fallacy', in which two distinct constructs are incorrectly considered as the same (Marsh, 1994). Exploring this issue will provide theoretical clarity and precision on motivational factors that should be targeted to improve endurance performance.

In sum, the present study has two aims. First, we wished to develop and test a within-person experimental manipulation of athletic identity salience and autonomous motivation in endurance contexts (Aim 1). Second, we examined whether athletic identity salience or autonomous regulation better predicted endurance performance via the desire to reduce effort and value of the performance goal (Aim 2). The findings will enable future research to examine causal effects of these motivational factors and enhance understanding of human endurance. The experimental within-person design of the study also poses a more rigorous test of the motivational model of endurance (Taylor, 2021) compared to previous non-experimental research.

2. Methods

2.1. Participants

Participants were required to be between 18 and 40 years old, identify with any gender, and be free from pre-existing medical conditions that increased health risk during high-intensity exercise. They were also required to be physically active, exceeding 150 min of moderate intensity exercise or 75 min of vigorous exercise per week to mitigate any risk associated with high intensity exercise. Participants either competed in sport or studied sport-related subjects to increase the likelihood that the performance profiling task and time trial would resonate with participants and they would appropriately engage with the two tasks. Based on this criteria, 37 participants took part in the study (24 males, 13 females, age range 20–27 years old). This sample size exceeded the minimum 30 level-2 units (i.e., participants in the present study) coupled with five level-1 units (i.e., measurement points in the present study) required for reliable statistical parameters in multilevel modelling (Maas & Hox, 2005).

2.2. Procedure

The study received clearance from a university research ethics committee in the United Kingdom. Participants were informed about the study procedure and potential risks, that participation was voluntary, their data would be stored anonymously, and they could withdraw at any point without consequences. Prior to the sessions, participants were asked to complete a pre-screening health questionnaire and the International Physical Activity Questionnaire (Craig et al., 2003) to assess inclusion criteria. Participants were asked to refrain from strenuous exercise 24 h prior to the experimental sessions and avoid consuming alcohol or caffeine in the preceding 12 h. It was recommended that participants had their last main meal at least 3 h prior to the session and were also asked to repeat the same dietary routine prior to both sessions.

Upon arrival at the laboratory, the procedure was described and participants were given the opportunity to ask any questions before providing written informed consent. Participants completed a 3-min warm up at a self-selected intensity on an electronically braked cycle ergometer (Lode Excalibur Sport, Lode B.V. Groningen, The Netherlands). The ergometer was set up to suit the participants as they saw fit, and details were recorded so that the positions remained the same in both sessions.

After the warm-up, participants were asked to complete either the control or experimental task, both lasting a total of 5 min. The order of these conditions was counterbalanced. The control task consisted of writing about how the participant maintains good relationships with friends and family. This task has been shown to activate low-level construals focused on concrete actions, rather than high-level construals that could potentially make participants' identity salient (Fujita et al., 2006). The experimental task consisted of a performance profile activity, in which participants listed the most important qualities that would help them succeed in the subsequent endurance task (adapted from Butler & Hardy, 1992). This task was followed by a 0–10 self-assessment on these qualities (zero being "I do not embody this trait at all" and ten being "I embody this trait completely". Immediately following this, participants completed measures of athletic identity and autonomous regulation.

In both experimental conditions, participants then performed an incrementally difficult cycling test with the goal of cycling for as long as possible. Participants started the test cycling at 100 W, with the workload increasing by 25 W every two and a half minutes (Hawley & Noakes, 1992). Participants could see their revolutions per minute but all other performance data regarding the trial (i.e., time and watts) were not disclosed to participants. The task continued until the participants terminated the test or cadence dropped by ten revolutions per minute from participants' usual rate. Thirty seconds after each stage commenced, participants were asked to rate their desire to reduce effort and the importance of achieving their goal. After a cool down, participants were debriefed about the nature of the study, and estimates of physical fitness (i.e., VO_2 max, peak power output and functional threshold power) were provided as a reward to the participants. Please see Fig. 2 for an illustration of these procedures.

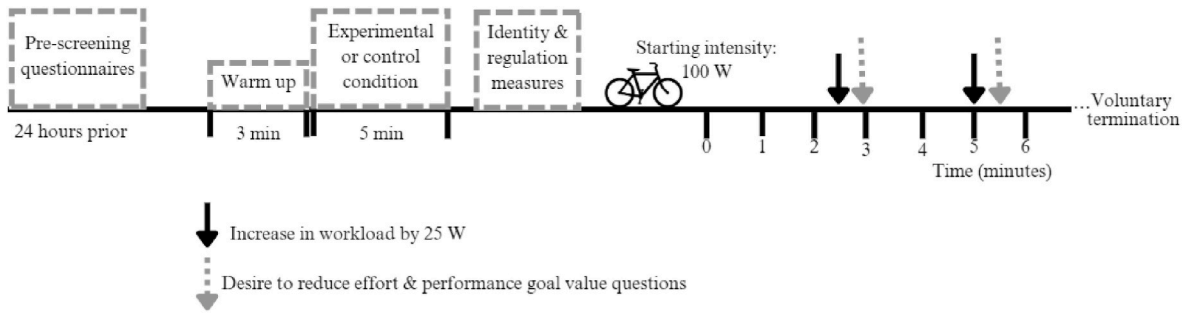


Fig. 2. Illustration of the study protocol.

2.3. Measures

Athletic identity. The Athletic Identity Measurement Scale (Brewer & Cornelius, 2001) measured participants' athletic identity. The scale consists of seven items responded to on a scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Example items include "I consider myself an athlete" and "sport is the most important thing in my life". The mean value of the item scores was calculated to provide an estimate of overall athletic identity. Previous research has indicated the validity of the scale across different competitive levels of athlete and gender (Brewer & Cornelius, 2001).

Autonomous motivation. The Situational Motivation Scale (Guay et al., 2000) was used to measure participants' autonomous motivation towards the cycling task. Participants responded to 16 items on a 7-point scale ranging from 1 (corresponds not at all) to 7 (corresponds exactly). The questionnaire assesses intrinsic motivation (four items; e.g., 'because this activity is fun'), identified regulation (four items; e.g., 'because I think this activity is good for me'), external regulation (four items; e.g. 'because I feel like I have to do it'), and amotivation (four items; e.g., 'I do this activity but I am not sure if it is worth it'). Scores for the intrinsic motivation and identified regulation sub-scales were averaged to provide a score of autonomous motivation towards the task. The external regulation and amotivation subscales, which measure non-autonomous motivation, were not used in the data analysis.

Desire to reduce effort and performance goal value. To measure the desire to reduce effort, participants verbally responded to the question "to what extent do you want to reduce your effort" on a scale ranging from 0 (not wanting to reduce effort at all) to 20 (definitely wanting to reduce effort immediately). The value of the performance goal was measured using the question "please rate how important it is to achieve your goal" with participants responding on a scale ranging from 0 (not important at all) to 20 (extremely important). Similar scales have demonstrated nomological validity in previous research examining the desire-goal conflict in endurance contexts (Taylor et al., 2022; Wellings et al., 2024).

Endurance performance. Performance was measured by the time in seconds that participants persisted on the cycling task.

2.4. Data analysis

Multilevel analysis using Mlwin software (version 3.05; Charlton et al., 2020) was used to examine the study hypotheses. This type of analysis was conducted due to the hierarchical structure of the data. Specifically, the repeated measures of desire to reduce effort and performance goal values were nested within experimental conditions, which were nested within participants.

To examine whether the experimental protocol successfully manipulated salience of athletic identity, a multilevel model was constructed with experimental condition entered as a binary predictor variable (0 = control; 1 = experimental manipulation) and athletic identity as the dependent variable. We also established whether order effects existed by including the order of conditions as a second binary predictor variable (0 = control condition first; 1 = experimental condition first), as well as the interaction between the two predictor variables (model 1). This model was repeated with autonomous regulation as the dependent variable (model 2). Any significant interactions in the models were interpreted using simple slopes analysis applied to multilevel analysis (Curran et al., 2006).

In the next phase of analysis (Aim 2), athletic identity and autonomous motivation were entered as predictors of endurance performance (i.e., direct effects model; model 3). The two predictor variables were group mean centered, so that they reflected within-person effects (i.e., deviations from each participant's average score across the two conditions). Indirect effects were subsequently tested using established guidelines for testing mediation in multilevel models (Krull & MacKinnon, 2001). In multilevel models it is not possible for a lower-level variable to predict a higher-level variable, therefore, the average change per stage in desire to reduce effort and performance goal were entered into the models. Two models assessed the relationship between the independent variables (athletic identity and autonomous regulation) and the desire to reduce effort (model 4) and performance goal value (model 5). In the next step, a model was constructed with the two independent variables (athletic identity and autonomous regulation) and the two mediating variables (desire to reduce effort and performance goal value) predicting endurance performance (model 6). If the predictor variables were significantly associated with the mediator variables in models 4 and 5, and the mediator variables predicted endurance performance after controlling for the predictor variables in model 6, then indirect effects were evidenced. The statistical significance of the indirect effects was scrutinized using Sobel tests (Sobel, 1982).

3. Results

3.1. Descriptive statistics

Descriptive statistics for the study variables across conditions can be

Table 1
Descriptive statistics for the study variables in each condition.

	Control condition		Experimental condition	
	M(*SD*)	Min. – Max.	*M*(*SD*)	Min. – Max.
Autonomous motivation	4.36(1.15)	1.63–6.75	4.41(1.20)	1.5–6.75
Athletic identity	4.66(1.00)	2.57–6.71	4.86(0.94)	2.86–6.71
Average change in desire to reduce effort	3.67(2.63)	−1.50 – 14.00	3.43(2.29)	0–14.00
Average change in performance goal value	−1.28(1.95)	−7.00 – 2.57	−1.36(1.79)	−7.00 – 1.5
Endurance performance (seconds)	864.00(383.40)	277–1549	859.38(370.42)	267–1636

found in Table 1. Bivariate correlations among study variables can be found in Table 2. Participants completed 6.03 stages ($SD = 2.54$), on average, equivalent to approximately 15 min of work. Intercept-only models for the two independent variables revealed that 96 percent of the variance in athletic identity was attributable to between-person variation, however, the four percent variance across experimental conditions was significantly different from zero ($\sigma^2_e = .04$; $p < .001$). Similarly, 93 percent of the variance in autonomous motivation was attributable to between-person variation, and the seven percent variance across experimental conditions was significantly different from zero ($\sigma^2_e = .09$; $p < .001$). Cronbach's alpha coefficients for the athletic identity (control $\alpha = .80$; experimental condition $\alpha = .75$) and autonomous regulation scales (control $\alpha = .89$; experimental condition $\alpha = .82$) were acceptable.

3.2. Experimental manipulation of athletic identity and autonomous regulation (aim 1)

Multilevel models revealed that athletic identity (model 1) was higher in the experimental condition, compared to the control condition ($b = .05$, $p = .005$). However, this experimental effect interacted with the order that the two conditions were undertaken by participants ($b = .32$; $p < .001$). Simple slopes analysis revealed that the experimental effect was larger when the experimental condition was presented first to participants ($b = .37$; $p < .001$), compared to second ($b = .05$; $p < .001$), albeit both were statistically significant.

No differences were observed in autonomous motivation (model 2) across experimental conditions ($b = .05$, $p = .21$), however, the experimental effect interacted with the order that conditions were undertaken by participants ($b = -.19$; $p < .001$). Simple slopes analysis revealed that the experimental manipulation unexpectedly reduced autonomous motivation when it was presented first to participants ($b = -.14$; $p = .001$), whereas no significant changes occurred when it was presented second ($b = .05$; $p = .15$).

3.3. Athletic identity and autonomous motivation as predictors of endurance performance (aim 2)

In a direct effects model (model 3), within-person changes in autonomous motivation ($b = 31.02$, $p < .001$), but not athletic identity ($b = -5.34$, $p = .58$), positively predicted endurance performance. In model 4 (independent variables predicting the mediator), neither within-person changes in athletic identity ($b = .13$, $p = .34$) nor autonomous motivation ($b = -.16$, $p = .08$) predicted desire to reduce effort. Within-person changes in autonomous motivation ($b = .39$, $p < .001$) but not athletic identity ($b = 19$, $p = .19$) predicted average change per stage in performance goal value (model 5). This analysis meant that only an autonomous motivation > performance goal value > endurance performance process met the criteria for mediation.

In model 6, within-person changes in desire to reduce effort ($b = -13.68$, $p < .001$) and performance goal value ($b = 19.03$, $p < .001$) predicted endurance performance, after controlling for athletic identity ($b = -7.14$; $p = .43$) and autonomous motivation ($b = 21.49$, $p < .001$). Overall, an autonomous motivation > performance goal value > endurance performance process met the criteria for mediation, and the statistical significance of the indirect effect was confirmed through a Sobel test ($z = 3.45$, $p < .001$). An overview of the hypothesized processes tested in models 3–6, as well as those supported by the data, can be seen in Fig. 1.

4. Discussion

The present study examined athletic identity and autonomous motivation as potential pre-task foundations of endurance performance. The first aim of the present study was to develop and test a within-person experimental manipulation of athletic identity and autonomous motivation in endurance contexts. However, our experimental manipulation systematically increased the salience of athletic identity but not autonomous motivation. The second aim was to remove theoretical ambiguity by examining whether athletic identity or autonomous motivation better predicted endurance performance via the desire to reduce effort and the value of the performance goal. Within-person changes in autonomous motivation positively predicted changes in endurance performance, via the performance goal value but not the desire to reduce effort. Changes in the salience of athletic identity did not explain differences in endurance performance. These findings are discussed in detail below.

As intended, our experimental manipulation successfully altered the salience of athletic identity in the expected direction. By asking participants to complete a brief version of a performance profile, we were able to increase reported athletic identity prior to an endurance task. This change occurred even though the sample already possessed a significant athletic identity (as suggested by the mean scores in the control condition). It is likely that this change occurred because the performance profile technique leads to *increased attention* on the self (Castillo & Chow, 2020; Weston et al., 2013), rather than any increases in athletic identity *per se*. Asking participants to identify personal characteristics necessary for a successful endurance task may have also enhanced task-identity congruence (Berkman et al., 2017), albeit we did not measure this specifically. Irrespective of the precise mechanism that was targeted, this methodological development is significant because it provides a basis for future research to experimentally activate participants' athletic identity and observe the consequences. This seems an important line of enquiry given that identity is such a powerful motivator of behavior. The overall effect size of the experimental manipulation was relatively small, likely because the sample already possessed a significant athletic identity. However, the data suggests that the effect of the intervention could be optimized by employing the performance profile task before the control condition. It is possible that the novelty of the experimental session combines with the effects of the manipulation in some way to enhance the effect. When the performance profile was given to participants second, the experimental manipulation remained statistically significant, but the small effect size suggests that any changes would lack ecological meaningfulness and downstream effects on performance (or any other outcome variable) would be unlikely.

Given prior assumptions and evidence (Chow et al., 2019; Weston et al., 2013), we expected our performance profile task to also enhance autonomous motivation, however, this was not the case. Ceiling effects

Table 2
Bivariate correlations between study variables in each condition.

	Control condition				Experimental condition			
	2	3	4	5	2	3	4	5
1. Autonomous motivation	**.42**	.05	.10	−.06	**.37**	.23	−.04	.22
2. Athletic identity		−.27	.14	**.39**		−.15	−.09	**.42**
3. Average change in desire			**−.54**	**−.61**			**−.65**	**−.54**
4. Average change in goal				**.43**				**.34**
5. Endurance performance								

Note. Correlations in bold signify statistical significance ($p < .05$).

may explain the lack of increases in autonomous motivation in the present study, although this did not stop athletic identity being enhanced. A more likely explanation is the brevity of this version (5 min) compared to the full four stage-process used in applied settings (Chow et al., 2019). Irrespectively, we cannot recommend using this modified performance profile technique to shift autonomous motivation in a laboratory setting.

The second objective in the present study was to establish whether athletic identity and autonomous motivation predict endurance performance. Our results are clear, autonomous motivation, not athletic identity, can be described as a motivational basis of endurance performance. Accordingly, future descriptions of the motivational model of endurance (Taylor, 2021), should describe autonomous motivation as the pre-task cornerstone of endurance. The rigorous within-person experimental method employed should be emphasized at this point to differentiate this finding from previous, largely cross-sectional work in this area. Direct effects models revealed that within-person *changes* in autonomous motivation were associated with subsequent *changes* in endurance performance. The effect size was ecologically meaningful with a one unit increase in autonomous regulation associated with more than a 31 s increase in performance. OIT (Ryan & Deci, 2017) has a rich tradition in sport psychology, yet there is limited evidence on the motivation-performance relationship, especially in experimental settings and actual performance behavior (i.e., not self-reported or perceived performance). A direct relationship between autonomous motivation and endurance performance have been found in similar samples to the present study (Taylor et al., 2020), but not in children (Mouratidis et al., 2008). Autonomous motivation has been associated with performance defined as a ratio between the number of victories and the number of matches played by tennis athletes (Gillet et al., 2009). A positive relationship was also found between autonomous motivation and judo performance, as defined by competition rankings (Gillet et al., 2010). While these studies employed objective measures of performance, they differ significantly from the type of performance examined in the present study. Hence, the findings of the present study add to the credibility of OIT as an athlete performance framework and imply that enhancing autonomous motivation by a small degree can have considerable implications for endurance performance.

Building on this direct effect, the relationship between changes in autonomous motivation and changes in endurance performance was found to be partially mediated by changes in the performance goal value. That is, when an endurance task is congruent with one's sense of self, the motivational magnitude of the athlete's performance goal declines slower over the course of the activity, compared to self-incongruent tasks. In turn, this process leads to greater endurance. It is theoretically interesting that changes in the desire to reduce effort did not mediate the motivation-performance relationship. Specifically, changes in the desire to reduce effort predicted changes in endurance performance, but this relationship was not preceded by changes in autonomous motivation. This finding contrasts with previous correlational work (Taylor et al., 2020) but may provide added depth to the motivational mechanisms described in the motivational model of performance (Taylor, 2021). The findings in the present study imply that the two components of the desire-goal motivational conflict each represent important determinants of endurance performance. The desire to reduce effort seems to be primarily determined by physiological responses to exercise, such as blood lactate concentration and ventilatory responses (Taylor et al., 2022; Wellings et al., 2024). In contrast, the performance goal value seems to be determined more (but not exclusively) by cognitive factors, such as autonomous motivation. This distinction means that the performance goal value is primarily determined by athletes' motivational state *prior* to the endurance activity, whereas the desire to reduce effort is primarily influenced by physiological dynamics *during* the activity. These dual processes can inform individualized intervention depending on the point of weakness in an athlete's motivational processes. A reduced ability to maintain the magnitude of the performance goal can be improved by cognitive intervention, whereas a reduced ability to minimize the desire to reduce effort can be targeted by interventions that dampen physiological responses.

Previous work has identified many strategies to foster autonomous regulation, such as seeking input from athletes when making decisions and providing a meaningful rationale for activities (Standage, 2023). These recommendations are usually made to promote engagement or well-being in sport; however, the findings of the present study imply that similar strategies can be adopted to make goal-oriented motivation more robust during endurance activity and enhance performance.

4.1. Future directions and limitations

The present study represents methodological and theoretical developments concerning motivation and endurance performance. The within-person design represents a rigorous step-forward in this area, nonetheless, the study is not without its limitations. The discord between experimentally shifting athletic identity, but changes in autonomous motivation leading to changes in performance prevents any causal conclusions. Existing between-person manipulations involving provision of choice (Legault & Inzlicht, 2013; Steel et al., 2021) and psychological need support (Deci et al., 1994) are the most reliable methods to experimentally manipulate autonomous regulation. Future research may wish to adapt these methods to a within-person scenario or devise new experimental manipulations to attempt to establish causality. The experimental manipulation successfully shifted the degree to which participants' athletic identity was salient. Nonetheless, validity should be viewed as an ongoing endeavor and further evidence of the protocol's effectiveness is needed, especially to clarify whether the order effects found in the present study are replicable. Participants in the present study were from a sporting background; but only reported athletic identity scores slightly above the midpoint of the scale. Therefore, this work could also examine whether the experimental method leads to similar increases in salience in participants with a more prominent athletic identity. For obvious reasons, the experimental protocol is unlikely to be effective in samples with no athletic identity because the task would be meaningless to them.

Potential theoretical advancements can also build on the present study. The desire to reduce effort and the performance goal were associated with endurance performance, however, future research could examine the relative conflict between the two (i.e., the difference in motivational strength between the two constructs). In other words, does the difference in between desire and goal magnitude contribute to explaining performance over and above the absolute strength of each construct? In this study and previous work, the motivational magnitude of the performance goal has been the central focus. Nonetheless, the *content* of the goal may influence the resilience of the goal as endurance efforts become increasingly difficult (e.g., ego-versus task-oriented goals; Roberts & Nerstad, 2020). Similarly, the underpinnings of the desire to reduce effort may also be important. For example, desiring to reduce effort due to boredom may lead to different consequences compared to a desire to reduce effort to relieve pain.

The present study operationalized the desire to reduce effort and performance goal value as the average difference per stage. Other studies have measured mean scores (Taylor et al., 2020; study 2), within-person changes (Taylor et al., 2022) or growth trajectories (Taylor et al., 2020; study 1; Wellings et al., 2024). An assessment of these different measurements would be fruitful. This clarification would advance the theory by examining whether the motivational magnitude (i.e., levels) or the motivational resilience (i.e., change) in the desire to reduce effort and performance goal value has more relevance to endurance performance.

5. Conclusion

The present study developed a new within-person experimental manipulation of athletic identity, but the same manipulation did not systematically alter autonomous motivation. From a theoretical viewpoint, changes in autonomous motivation can explain variance in athletic endurance because the motivational value of the performance goal is characterized by greater robustness. This finding means that autonomous motivation should be emphasized in practice to enhance endurance performance.

CRediT authorship contribution statement

Ian M. Taylor: Writing – review & editing, Writing – original draft, Supervision, Investigation, Formal analysis, Data curation, Conceptualization. **Lara Drewes:** Writing – original draft, Project administration, Methodology, Investigation. **Dani Fort:** Writing – original draft, Resources, Project administration, Methodology. **George Horne:** Project administration, Methodology, Investigation. **Stephen Quercia-Smale:** Project administration, Methodology, Investigation. **Izzy G. Wellings:** Supervision, Project administration, Methodology, Formal analysis.

Declaration of competing interest

Given their role as Associate Editor, Ian Taylor had no involvement in the peer-review of this article and has no access to information regarding its peer-review. Full responsibility for the editorial process for this article was delegated to Prof. Markus Raab and Prof. Amanda Rebar.

Data availability

Data will be made available on request.

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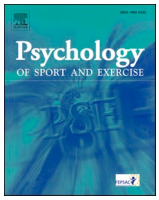

Corrigendum

Corrigendum to "Athletic identity and autonomous motivation as predictors of endurance performance during high intensity exercise" [Psychology of Sport and Exercise, 80 (2025) 102872]

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The authors regret that one of the authors' names was spelt incorrectly. The correct name is Steven Quercia-Smale. The authors would like to apologise for any inconvenience caused.

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