The influence of identity leadership principles on followers' challenge and threat states and motor performance

Anthony J. Miller [a], Matthew J. Slater [a], Martin J. Turner [b]

Accepted 3rd February 2021 in Psychology of Sport and Exercise

[a] School of Life Sciences and Education, Staffordshire University, Stoke-on-Trent, ST4 2DF, UK

[b] Department of Psychology, Manchester Metropolitan University, Manchester, M15 6GX

Corresponding author:

Anthony J. Miller, email: Anthony.miller1@staffs.ac.uk

Second author:

Matthew J. Slater, email: M.Slater@staffs.ac.uk

Third author:

Martin J. Turner, email: M.Turner@mmu.ac.uk

Abstract

It has been theorized that a follower can draw upon support from individuals they identify with when approaching competitive situations to improve psychophysiological challenge states, and performance potential. As such, we examine how perceptions of identity leadership influence resource appraisals, cardiovascular reactivity, and performance in a pressurised motor task across two laboratory experiments. In Study 1, 80 participants took part in a within-subjects double-blind design with two conditions: identity leadership (IL) vs no identity leadership (no IL). Results indicated that when instructions align with identity leadership principles (vs. not), followers reported greater resource appraisals to, challenge cardiovascular reactivity to, and motor performance within a motivated performance situation. In Study 2, 120 participants completed a 2 (identity leadership: IL vs. no IL) X 2 (appraisal: challenge vs. threat) between-subjects double-blind design. It was found that when instructions aligned to identity leadership (vs. not), followers reported greater resource appraisals and motor performance. When leaders used challenge (vs. threat) instructions this led to challenge cardiovascular reactivity on approach to competition. Advancing leadership and stress theory, we provide evidence that perceived identity leadership is salient for followers' resource appraisals, cardiovascular reactivity, and motor performance.

Keywords: Leadership; Social Identity; Appraisal; Stress; Performance

Group processes are central to cognition and behaviour, and the social identity approach is a prominent and growing framework that places these group processes at its core (Tajfel & Turner, 1979; Turner et al., 1987). Within the social identity approach it is proposed that individuals define themselves in two different ways when within a social context. People define themselves as individuals (i.e., personal identity; 'I' and 'me', e.g. kind, passionate) and as group members (i.e., social identity; 'we' and 'us', e.g. a football team). Our social identities hold meaning and define who we are and the way we behave in specific environments. For social identities to hold importance, an emotional value and significance towards a group is needed (Tajfel, 1972, p. 292). A significant part of a group that can influence members' cognition and behaviour is the leader.

The leader of a group (e.g., a coach) significantly influences group processes such as commitment to group goals and communication (Haslam et al., 2020), being the individual that unites and mobilizes follower efforts (Rees et al., 2015). The process in which leaders influence followers' (e.g., athletes) cognition and behaviour is through leaders representing and promoting a shared group identity (Haslam et al., 2020). The social identity approach to leadership contends that group members define themselves – to a greater or lesser extent – as part of an in-group, seeing themselves as not only "I" but as one of "us". Accordingly, the success of any leader hinges on their ability to develop, manage, and advance a shared sense of "us". In-line with the social identity approach, a substantial body of evidence has found that a leader who is able to create a shared social identity enhances follower trust (Giessner & van Knippenberg, 2008; Haslam et al., 2012), respect, cooperation, perceptions of social support (Haslam et al., 2012), resilience (White et al., 2020), performance (Zhu et al., 2015), effort, and attendance (Stevens et al., 2019). Specifically, identity leadership comprises of four principles (Haslam et al., 2020) whereby leaders: (1) endorse the unique qualities that define a group that they lead (i.e., identity prototypical); (2) advance and promote the core

interests of the group (i.e., identity advancement); (3) bring people together by creating a shared sense of “we” and “us” (i.e., entrepreneur of identity); and (4) organise events and activities that give weight to the group's existence (i.e., impresario of identity).

Research has evidenced that global identity leadership (i.e., a culmination of the four principles) positively influences attendance and effort in sport and exercise classes through improvements in group identification (Steffens et al., 2014, Study 2; Steffens et al., 2019; Stevens et al., 2018). In other words, to the extent that, a leader is able to develop, manage, and advance a shared sense of "us”, members see themselves as characteristic of the in-group, valuing in-group-norms and in turn, enhancing mobilization to engage in group behaviour (i.e., effort and attendance). In identifying the mechanisms through which a shared sense of “us” influences performance, Slater and colleagues (2018) found that relational identification (i.e., a (partial) definition of oneself in terms of a given role-relationship; Sluss & Ashforth, 2007) influences resource appraisals, cardiovascular challenge and threat responses to, and performance within, competitive events. Results provided evidence that poor relational identification led to cardiovascular threat responses, and a strong relational identification with a leader positively influenced follower self-efficacy (i.e., judgments of what can be accomplished), perceived control (i.e., actual and perceived control available over actions) and an approach focus (i.e., aiming to show competence), and cognitive performance within competitive situations (Slater et al., 2018). Reinforcing this position, Haslam and Reicher (2006) showed that as shared identification with a group declines, interindividual support decreases, negatively influencing cortisol levels (i.e., physiological stress) of members. Conversely, as shared identification increases, interindividual support improves, positively influencing physiological stress (i.e., cortisol; Haslam & Reicher, 2006). In addition, Häusser et al. (2012) found that being part of a group buffers stress levels (e.g. cortisol) when members of the group develop a shared sense of identity. To explain this process, being part

of a group that provides purpose, belonging and meaning makes us feel distinctive, efficacious, and successful. This improves a members' mobilization to support their peers, putting the group in a better position cope with negative consequences such as stress (Haslam et al., 2009).

A common measure of psychophysiological stress within sport, as used by Slater and colleagues (2018), is the theory of challenge and threat states in athletes (TCTSA; Jones et al., 2009). The TCTSA posits that two psychophysiological states (i.e., challenge and threat) are pivotal in influencing cognitive and motor performance. A challenge state occurs when perceived resource appraisals (e.g., self-efficacy, control, approach goals) meet or exceed situational demands (e.g., effort required, uncertainty of the situation, potential for danger). This challenge state, characterized by a positive valence towards success, is an adaptive response to a stressor, leading to superior performance and well-being (Behnke & Kaczmarek, 2018; Jones et al., 2009). A threat state occurs when personal resources do not meet perceived situational demands (Jones et al., 2009), being characterized by a negative valence towards success, leading to inferior performance. Specifically, self-efficacy, perceived control, and an approach focus are key determinants of adaptive cardiovascular reactivity (i.e., a challenge state) towards salient competitive situations (Jones et al., 2009).

As posited in theory (Blascovich & Mendes, 2000) and research (Tomaka et al., 1997), hemodynamic CV markers objectively identify whether an individual perceives a stressor as adaptive (i.e., challenge) or maladaptive (i.e., threat). In wake of a competitive scenario, heart rate (HR; heart beats per minute [bpm]) is elevated. Though, what distinguishes challenge and threat states is cardiac output (CO; litres of blood pumped from the heart per minute [l/min]), and total peripheral resistance (TPR; sum of the resistance of all peripheral vasculature in the systemic circulation [dyn.s.cm-5]). A challenge state is indexed by increases in CO, and decreased TPR, encouraging efficient energy usage through increases

in blood glucose, free fatty acids (fuel for the nervous system and muscles, respectively) and volume of blood flow to the brain and muscles (e.g., Dienstbier, 1989). Conversely, a threat state is characterized by a slight change in CO and an increase or stabilization in TPR. Markedly different, a threat state restricts efficient energy usage, limiting blood flow to the brain and muscles (e.g., Dienstbier, 1989).

In sum, research has showed that perceptions of coach identity leadership can positively influence resource appraisals in the wake of a competitive event (Miller et al., 2020), and that identification can influence psychophysiological challenge and threat states and performance (e.g., Slater et al., 2018). The mechanism through which social variables influence psychophysiological stress is the perception that a follower (i.e., athlete) can draw on support from individuals they identify with (e.g., a coach, a team). With this, athletes can use opportunities for support from a coach/team in anticipation of a motivated performance situation, improving psychophysiological challenge states and performance (Meijen et al., 2020). The present programme of research contributes to both identity leadership and stress theory by addressing whether global identity leadership manipulations can influence perceptions of group identification, psychophysiological challenge and threat states, and motor performance in an experimental setting.

There has been sparse experimental research understanding the influence of identity leadership on challenge and threat states and performance (see Slater et al., 2018; 2019). Given that recent stress theory postulates that psychophysiological stress can be influenced by social variables such as leadership (Meijen et al., 2020), experimental research manipulating perceptions of leaders is necessary. Further, we address a call by Turner and colleagues (2014) by using a repeated measures methodology to examine intraindividual differences in psychophysiological challenge and threat. As such, by manipulating identity leadership in ways previously conducted (Stevens et al., 2018), and utilizing stress markers as

used in comparable research (Slater et al., 2018), novel insight can be gained by examining the influence of global identity leadership on group identification, psychophysiological challenge and threat, and motor performance. In previous research: (1) identity leadership has been treated as a global construct (i.e., van Dick et al., 2018; Stevens et al., 2018); (2) leadership has been manipulated in ways proposed (identity leadership vs no identity leadership; Stevens et al., 2019); (3) identification has been found to influence physiological stress (identification leads to positive stress responses; Haslam et al., 2006; lack of identification leads to negative stress responses; Slater et al., 2018) and (4) it is through manipulating psychophysiological responses (Slater et al., 2018) that identification influences performance. From this, in the current research, we fully test the extent to which global identity leadership (IL vs. no IL[1]) influences perceptions of group identification, psychophysiological states on approach to competition, and performance on a motor task. Formally, based on findings from previous research (Haslam et al., 2006; Slater et al., 2018), we test the following hypotheses in Study 1:

H1: Identity leadership will result in a challenge state (adaptive appraisal and CV reactivity) whilst a lack of identity leadership will result in a threat state (maladaptive appraisal and CV reactivity) in followers on approach to a pressurised motor task.

H2: Identity leadership will result in increased performance compared to baseline on a pressurised motor task, whilst a lack of identity leadership will result in poor performance compared to baseline on a pressurised motor task.

Psychophysiological challenge and threat can also be manipulated by challenge and threat instructions (Slater et al., 2018; Turner et al., 2014). In other words, researchers have found that it is possible to manipulate cardiovascular challenge and threat by using language

[1] IL refers to the enactment of identity leadership principles, whilst no IL refers to no enactment of identity leadership principles within the experimental conditions. All scripts of the conditions used can be found within the supplementary file.

pertaining to theorised resource appraisals (e.g., by increasing or reducing self-efficacy: Turner et al., 2014), holding implications for performance (see Turner et al., 2014). Accordingly, we aim to manipulate perceptions of identity leadership to identify whether there is an interaction effect between identity leadership and challenge and threat instructions on followers' psychophysiological stress reactivity and motor performance. It has been established that both: (1) challenge instructions induce challenge states, which, in turn, leads to greater motor performance; and (2) threat instructions induce threat states, which, in turn, leads to depleted performance (Turner et al., 2014). Regarding leadership, it has been found that under conditions of elevated perceived group identification (through providing the same kit for all participants), leaders who express high levels of team confidence (i.e., a resource appraisal) improve follower confidence, in turn improving motor performance (Fransen et al., 2015). On the other hand, again under conditions of elevated perceived group identification, when a leader expresses low team confidence, this depletes follower confidence, negatively influencing motor performance (Fransen et al., 2015). As such, we expect that identity leadership will further enhance challenge responses (when challenge instructions are given) as well as further enhance threat responses (when threat instructions are given). With the common research finding that identity leadership positively influences group identification (Stevens et al., 2018), and on the grounds that resource manipulation (i.e., expressing or not expressing confidence) has consequential effects on performance (i.e., both positively and negatively) irrespective of group identification (Fransen et al., 2015), we examine the following hypothesis for study 2:

H3: There will be an interaction effect such that compared to the no identity leadership conditions, enactment of identity leadership will exacerbate psychophysiological challenge and threat responses to stress.

Turner and colleagues (2014) used a bean bag throw as a performance indicator when manipulating the way an individual sees a motivated performance situation. This novel indicator was performed under competitive conditions to create a motivated performance situation. The authors' aim was to eliminate prior task experiences that nullify the effects of task instructions. To this end, the performance indicator in the present studies created the same climate by using a novel ring toss throw on various targets. A key component here is that challenge and threat states influence decision making processes (Jones et al., 2009). Unlike Turner and colleagues' (2014) research, we create distinct targets that must be aimed at individually (e.g., either aim for a score of 2, 4, 6, 8, or 10). Here, it is possible to assess an individual's performance intention as well as actual performance. Thus, the present research aims to identify the effect challenge and threat responses have on both throwing intention and actual performance, detecting any discrepancies between the two. It is unknown how and whether challenge and threat responses will affect performance intention (e.g., aiming for 10's vs aiming for 2's on all 10 throws).

H4: There will be an interaction effect such that compared to the no identity leadership conditions, enactment of identity leadership will exacerbate motor performance improvements (in challenge) and decrements (in threat).

Overview of the studies

Despite research identifying the effects of relational identification on individuals' psychophysiological challenge and threat responses (e.g., Slater et al., 2018), previous researchers are yet to identify whether leading in-line with the four principles of identity leadership (vs. not) effects followers' resource appraisals, cardiovascular challenge and threat, and pressurised motor performance. Within an experimental setting, we address this gap by examining H1 and H2 (Study 1) in a bid to enhance theoretical understanding of identity leadership and stress. Advancing Study 1, and examining H3 and H4, Study 2

investigates how identity leadership (IL vs. no IL) interacts with appraisal manipulating instructions (challenge vs. threat) in predicting psychophysiological stress reactivity and motor performance. Both Study 1 and 2 are the first to investigate the effects of manipulated identity leadership principles on followers' resource appraisals and challenge and threat reactivity ahead of a pressurised motor task in a highly controlled experimental design.

Study 1

Participants and design

Priori G*Power (v 3.1.6) repeated measures ANCOVA calculations (α error probability = 0.05, $1 - \beta$ error probability = 0.95, controlling for gender; Stoney et al., 1987) based on comparable research (Evans et al., 2018; Slater et al., 2018; $\eta^2_p \geq 0.13$, $f \geq 0.39$) were conducted, evidencing the need for a minimum total sample of 16 participants in a within-participants design. 80 undergraduate sport and exercise students (M_{age} = 21.14, ± 4.52; 56 males) from the same university took part in a within-participants double-blind counterbalanced experimental design. The double-blind design allowed for complete impartiality in data collection, therefore desired effects cannot be unconsciously manipulated by the researcher. Further, by using a within-subjects counterbalanced design, intraindividual differences in appraisal, physiological challenge and threat, and motor performance can be identified between conditions. As such, any effects found are attributable to the condition, not extraneous variables.

Procedure

Institutional ethical approval was gained prior to consent. A Finometer Pro was used to measure all cardiovascular challenge and threat responses (i.e., HR, CO, TPR) through an inflating finger cuff around the middle finger of the non-dominant hand. Participants were prepared following relevant guidelines (Sherwood & Turner, 1993). The present research replicated empirical approaches to researching psychophysiological stress (Häusser et al., 2012). The 40 practice throws, seated 1 metre away from the first target, was done to enable

familiarization of the task, minimizing carry over effects (see Keren, 2014), being a procedure used within challenge and threat research (Turner et al., 2012). Throughout the data collection process (for both Study 1 and 2) the lab temperature was maintained between 18 and 21˚ Celsius to ensure measurable circulation of blood to the hands during physiological assessment (Freeman et al., 1936) without vasoconstriction (Krog et al., 1960).

The participants were then informed that a five-minute rest period would commence in which CV data would be collected. After the rest period, participants would hear a set of audio-instructions. Participants then took part in one of the conditions (IL or no IL), instructing participants of the task, replicating similar research (e.g., Evans et al., 2018; Slater et al., 2018; Stevens et al., 2019). The manipulations: (1) portrayed the individual as a leader of the team that the participants are a member of; (2) used ego-threatening instructions (i.e. comparing performance scores with everyone else) to elicit a stress response (e.g., Turner et al., 2013); and (3) used a sentence on each of the identity leadership principles to depict the leader as an individual who does or does not represent, advance, create and embed a shared social identity (Haslam et al., 2020). Here, group-based identity was made salient by emphasizing the importance of the team (or not). As a validation check, the developed scripts were rated and validated by six independent social identity experts not involved in the project. The six experts were asked to rate the scripts (/10) to identify whether they depicted each of the identity leadership principles. The six experts noted that the sentences accurately depicted the leaders' prototypicality (M = 9.2), advancement (M = 9.2), entrepreneurship (M = 9.5) and impresarioship (M = 9.2). Both audio instructions (IL vs. no IL) were the same length to ensure that the double-blind counterbalanced design was adhered to (see Greenwald, 1976). Forty participants listened to the identity leadership instructions first (week 1) whilst 40 participants listened to the lack of identity leadership instructions first (and then listened to the opposing condition in week 2). In addition, we randomised the audio

clips to blind them to the experimenter (first author). The first author sent the two audio clips to the second author, who then returned the scripts, coded as 1 and 2, blinding the first author from condition.

Once the conditions were delivered, participants were asked to complete self-report questionnaires regarding perceptions of the leader, identification with the leader, and appraisal of the upcoming competition. From this, the participants were asked to complete a final performance trail of 10 throws. Following the procedure, participants were asked to come back a week later (at exactly the same time of the day) to repeat the process, participating in the other condition. Additionally, the conditions were delivered with a neutral tone to avoid any motivational inferences (e.g. Weinstein et al., 2018)

Measures

Manipulation checks

Identity leadership. To assess identity leadership, we used the Identity Leadership Inventory (ILI), which is a 15-item questionnaire that captures the four principles as outlined in theory (Steffens et al., 2014; van Dick et al., 2018). The questionnaire included items such as: '*The leader embodies what the team stands for*' (Identity-prototypical), '*The leader stands up for the team*' (Identity-advancement), '*The leader creates a sense of cohesion within the team*' (Entrepreneur of identity), and '*The leader creates structures that are useful for the team*' (Impresario of identity). 'The Leader' was changed to 'John' for all items, referring to the leader in the experiment. Replicating previous research (van Dick et al., 2018), composite scores of each subscale were created to form prototypicality, advancement, entrepreneurship and impresarioship scores. Responses are made on a Likert scale from 1 (*Disagree Strongly*) to 7 (*Agree Strongly*). The ILI has been validated for use with an adult population in 20 countries (van Dick et al., 2018), and, in our study, each sub-scale showed good internal consistency in each condition ($\alpha \geq .84$).

Group Identification. A 3-item questionnaire assessed how strongly participants identified with the group (cf., Haslam, 2004; Slater et al., 2018): '*I feel a strong connection with the team*', '*I identify strongly with the team*', and '*I feel no connection with the team*'. The final item is reversed scored, and responses are on a Likert scale from 1 (*not at all*), to 7 (*very true*). The reverse scored item was used to check participant engagement with conditions. If participants scored the reversed item the same as '*I feel a strong connection with the team*' and '*I identify strongly with the team*', their responses would be removed. No participants were removed. As in previous research (α = .81, Slater et al., 2018), good internal consistency was identified across conditions ($\alpha \geq .83$).

Task importance. As used in previous challenge and threat research (e.g., Slater et al., 2018; Turner et al., 2014), a single item identified whether the upcoming task was perceived to be important by participants, rated on a Likert scale from 1 (*not at all*) to 5 (*very much so*). Perceived importance is the mechanism through which cardiovascular challenge and threat responses occur (Blascovich et al., 2003; Jones et al., 2009).

Test variables

Self-Efficacy. Derived from Banduras (2006) guidelines, two items measured how confident the participant felt in performing well in the upcoming task (Turner et al., 2013). The questionnaire asked: '*In the following ring toss task, to what extent do you feel confident that you can perform well?*' and '*In the following ring toss task, to what extent do you feel confident that you fulfil your potential?*'. Participants reported on a Likert scale from 1 (*not at all*), to 5 (*very much so*). Internal consistency was good in both conditions ($\alpha \geq .82$).

Perceived control. Adapted from the Academic Control Scale (Perry et al., 2001), and extensively used within challenge and threat research (e.g., Turner et al., 2012), a single item was used to identify participants' perceived control over their upcoming performance. The participants were asked to what extent they agree with the statement; '*The more effort I put*

into the task, the better I will do'. The item was recorded on a 5-point Likert-scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Achievement Goals. The Achievement Goal Questionnaire (AGQ: Conroy et al., 2003) was used to identify participants' motivational disposition towards the task. The AGQ assesses mastery approach goals (MAp), mastery avoidance goals (MAv), performance approach goals (PAp), and performance avoidance goals (PAv). This was condensed to a 4-item measure for brevity (Turner et al., 2013), with a single item for each subscale. The items were recorded on a 7-point Likert-scale from 1 (*strongly disagree*) to 7 (*strongly agree*). The scale in this capacity has been individually validated (Conroy et al., 2003) in measuring resource appraisals (e.g., Slater et al., 2018; Turner et al., 2013).

Cardiovascular Challenge and Threat. A Finometer Pro was used to measure participants' CV challenge and threat responses. In-line with previous theory (Blascovich & Mendes, 2000; Jones et al., 2009) and research (e.g., Turner et al., 2014) we assessed challenge and threat via: HR (beats per minute), CO (l/min), and TPR ($dyn \cdot s \cdot cm^{-5}$). Typical of challenge and threat research (e.g., Moore et al., 2012; Turner et al., 2013), we converted TPR and CO into a single interrelated challenge and threat index (CTI). This was done by converting TPR and CO into z-scores and summing them. CO was weighted +1, while TPR was weighted -1. A positive value indicated challenge reactivity and a negative value indicated threat. In-line with research convention (e.g., Blascovich et al., 2004), as with task importance, HR was used as a prerequisite of challenge and threat states, acting as a further manipulation check to identify task engagement.

Motor performance. Resembling Turner et al.'s (2014) procedure, participants took 10 throws with their dominant hand towards 5 separate targets starting from 1 meter away from the seated throwing position. The targets started from small and near, to large and far away in equal distances from each other (15 cm distance; 38cm width between poles, 12cm

increments in height per pole, 3cm diameter poles). The first target was worth 2 points, with the second worth 4, third worth 6, fourth worth 8, and the fifth worth 10 points. Zero points were scored if a participant missed a pole. Higher scores indicated better performance, with a possible maximum total score of 100 and minimum of 0. In addition, we took participants' performance intention scores by asking them to call out which pole they were aiming for before they threw each ring. Performance and intention change scores were created (from baseline to performance).

Analytic Strategy

Prior to main analyses, Shapiro Wilks tests were performed, noting significant outliers of *z*-scores greater than two (Seery et al., 2008). In line with previous research (Miller et al., 2020; Smith, 2011), the data were winsorized, replacing extreme values to reduce the influence of outliers on the data. Overall, 6.95% of the data were winsorized. In assessing cardiovascular indices, HR was averaged for the first minute of post-task instructions and compared to HR in the last minute of the baseline data collection trial. Comparing HR at baseline and post instructions determined whether the task represented a motivated performance situation for participants. Much like challenge and threat research convention (Turner et al., 2012), indicators of challenge and threat (TPR and CO) for the entire post-task instruction phase were subtracted from the final minute of baseline data. All multicollinearity, normality and outlier checks met the assumptions necessary for all data analysis.

Initially, CV and performance change scores were created (from baseline to performance) to allow for comparison in change between identity leadership conditions (IL vs. no IL). Main analyses in assessing H1 and H2 involved repeated univariate analysis of variance (ANOVA), repeated multivariate analysis of variance (MANOVA) and repeated univariate analysis of covariance (ANCOVA). These were used to identify the differences in resource appraisals, physiological challenge and threat and motor performance (score and

intention) between the identity leadership conditions (IL vs. no IL). Gender was used as a covariate for physiological challenge and threat variables given the physiological stress differences between males and females (e.g., Stoney et al., 1987). Within additional analysis, Pearson's correlations identified the association between identity leadership, resource appraisals, physiological challenge and threat, and performance within the two conditions (see Table 2).

Results

Manipulation checks

Heart rate. Two paired samples *t*-tests indicated that heart rate (beats per minute) significantly increased from baseline (M = 74.97 ± .12.32) to performance phase (M = 79.74 ± .12.41) in the no IL, $t(79) = 16.66$, $p < .001$, and IL conditions, $t(79) = 13.58$, $p < .001$, M = 73.83 ± .10.63 to M = 78.87 ± 10.54. A further paired samples *t*-test indicated that heart rate change did not vary between IL (M = 5.04 ± 2.93) and no IL (M = 4.77 ± 2.42) conditions, $t(79) = .44$, $p = .662$.

Task importance. Two, one group *t*-tests indicated that task importance was significantly greater than zero in both the no IL, $t(79) = 46.61$, $p < .001$, M = 3.98 ± .76, and IL, $t(79)$ = 47.20, $p < .001$, M = 4.11 ± .78, conditions. A paired samples *t*-test indicated that perceived importance of the task was significantly greater in the IL (M = 4.11 ± .78) than in the no IL condition, $t(79) = 2.01$, $p = .048$, M = 3.98 ± .76. Critically though, perceptions of importance were high in both conditions.

Identity leadership. A repeated measures MANOVA indicated that there was a significant main effect of condition on prototypicality, advancement, entrepreneurship, and impresario of identity, Wilks' $\Lambda = .18$, $F(4, 76) = 89.38$, $p < .001$, $\eta^2_p = 0.83$. As expected, follow up comparisons indicated that the perceived enactment of leader prototypicality (IL: M = 5.90 ± .95; no IL: M = 2.28 ± 1.29), advancement (IL: M = 5.56 ± 1.07; no IL: M = 2.05 ± 1.18), entrepreneurship (IL: M = 5.54 ± 1.07; no IL: M = 2.22 ± 1.28), and impresarioship (IL: M =

4.63 ± 1.34; no IL: M = 2.07 ± 1.19) were significantly greater in the IL condition than the no IL condition (all *ps* < .001).

Group identification. A paired samples *t*-test indicated that compared to the no IL condition (M = 3.25 ± 1.61), group identification was significantly greater in the IL (M = 4.98 ± 1.24) condition, $t(79) = 8.20$, $p < .001$. Overall, the experimental manipulations were as expected.

Main Analyses

Self-efficacy and control. Two repeated ANOVA's indicated that perceived self-efficacy and control was significantly greater in the IL than in the no IL condition, $F(1,79) \geq 4.29$, $p \leq .042$. Mean and standard deviations of all main study variables can be found in Table 1.

Achievement goals. A repeated measures MANOVA identified that there was a significant main effect of condition on MAp, MAv, PAp and PAv goals, Wilks' $\Lambda = .82$, $F(4, 76) = 4.31$, $p = .003$, $\eta^2_p = 0.19$. Follow up comparisons identified that MAp goals and MAv goals were significantly greater in the IL condition than the no IL condition (all *ps* ≤ .039). In contrast, there were no differences in PAp goals and PAv goals between the conditions (all *ps* ≥ .937).

Cardiovascular Challenge and Threat. A repeated measures ANCOVA, controlling for gender, indicated that CTI varied as a function of condition, $F(1, 78) = 12.21$, $p = .001$, $\eta^2_p = .14$. The IL condition produced a significantly greater level of challenge compared to the no IL condition.

Motor performance. Repeated measures ANOVAs indicated that there was a significant difference in performance between conditions. First, there was a significant difference in performance score change between IL and no IL identity leadership conditions, $F(1, 79) = 18.69$, $p < .01$; $\eta^2_p = .19$. Performance was greater in the IL condition than in the no IL condition. Performance intention did not significantly differ between the IL and no IL conditions, $F(1, 79) = .00$, $p = .992$; $\eta^2_p \leq .001$. A correlation matrix of all variables can be found in Table 2.

Additional Analyses. Aligned with Turner and colleagues' (2013) study, performance change scores were coded (from baseline) as 1 (improvements) and 0 (decrements). ANOVA identified that those who performed better (n = 44) in the no IL condition perceived greater control (M = 4.16 ± .78) than those who performed worse (n = 36), $F(1, 78) = 4.06$, p = .047, M = 3.81 ± .79. In addition, CTI was coded as 1 (challenged) and 0 (threatened). ANOVA's indicated that those in the IL condition, were physiologically threatened, and performed worse (n = 8) reported lower levels of control (M = 3.5 vs 4.23, p = .008) than those who were physiologically challenged and performed better (n = 40).

[insert Table 1 here]

[insert Table 2 here]

Discussion

Study 1 showed some support for H1 and H2 in that no IL led to poorer resource appraisals, physiological states, and motor performance relative to IL. However, no IL did not lead to a) maladaptive appraisals of the event, nor b), a threat state as hypothesized (e.g. Slater et al., 2018). Instead, in partial support of H1 and H2, we found that in comparison to a lack of identity leadership, when instructed by an individual encouraging high levels of identity leadership, participants reported greater self-efficacy, control, mastery (approach and avoidance) goals, challenge CV reactivity and motor performance. No differences in intention were found between conditions. Participants also reported that the performance task was more important after listening to the IL condition (vs no IL). In addition, those who performed better in the no IL condition perceived greater control (but no other differences in appraisals) than those who performed worse. Lastly, in the IL condition, those who were physiologically threatened and performed worse reported lower levels of control than those who were physiologically challenged and performed better. In sum, experimental findings from Study 1 indicate that the manipulation of identity leadership principles influence

followers' challenge (and not threat) psychophysiological reactivity and performance. Advancing this, in Study 2 we examine whether an interaction effect occurs when challenge and threat instructions are introduced alongside identity leadership instructions for followers' psychophysiological CV reactivity and motor performance.

Study 2

Study 1 data showed that when leaders instructed whilst using the identity leadership principles (vs. not), followers' psychophysiological approach to (challenge), and performance on, a pressurised motor task, improved. Previous research has found that resource appraisal manipulation using audio conditions (e.g., high vs. low self-efficacy) alters participants' cardiovascular stress reactivity and motor performance (Turner et al., 2014). Based on Study 1 findings and previous research, in Study 2, we examined whether challenge and threat states become more or less pronounced when these instructions are delivered by a leader who instructs in-line with identity principles (vs. not). In doing this, it was possible to understand the effects of identity leadership on challenge and threat states when receiving challenge and threat instructions. Given previous findings (Fransen et al., 2015), we hypothesise that compared to no IL conditions, IL will exacerbate challenge and threat responses to pressure situations (H3). Further, we expect that compared to no IL, IL will exacerbate motor performance improvements (in challenge) and decrements (in threat; H4).

Methods

Participants and design

With a change in design, priori G*Power (v 3.1.6) between subjects ANCOVA calculations (α error probability = 0.05, $1 - \beta$ error probability = 0.95, 4 conditions, controlling for gender; Stoney et al., 1987) based on the results in Study one ($\eta^2_p \geq 0.14$, $f \geq 0.40$; large) were conducted, evidencing the need for a minimum total sample of 110 participants (the minimum η^2_p reported in Study one). This is supported by research that has

also manipulated challenge and threat responses (Turner et al., 2014; $d \geq .99$; large), being procedurally similar to the current study. The power analysis is based on Study 1 primarily due to Study 1 directly assessing the variables within the present study, enhancing efficacy of the power analysis (Schinke et al., 2020). One hundred and twenty sport and exercise undergraduate and postgraduate students from the same university (M_{age} 22.62 ± 5.65; 60 males and females) participated in Study 2 (independent from Study 1). 15 males and 15 females took part in each condition, thus controlling for any sex-based differences in stress reactivity and performance. Participants were assigned to one of four conditions in a 2 (identity leadership: IL vs. no IL) X 2 (appraisal: challenge vs. threat) between-participant double blind experimental design: (1) identity leadership challenge instructions; (2) no identity leadership challenge instructions; (3) identity leadership threat instructions; and (4) no identity leadership threat instructions. We opted for a between-subjects design to mitigate against the elevated chances of order effects with four repeated conditions (Charness et al., 2012).

Procedure and measures

Following institutional ethical approval, participants were invited to attend the laboratory and gave informed consent. The research procedure was the same as Study 1, with the only difference being the identity leadership manipulation. As in Study 1, we used a double-blind design, by blinding the experimenter to the randomisation of the audio clips.

Challenge instructions were used to elicit a CV challenge response, whilst threat instructions were used to elicit a threat response. To do this we manipulated resource appraisals as put forth in the TCTSA (Jones et al., 2009; Turner et al., 2014). Specifically, replicating previous research (Turner et al., 2014), for the challenge instructions, we aimed to promote self-efficacy ("*you will have performed similar throwing tasks in the past. Because of this experience, you can feel confident that you will score highly*"), perceived control ("*the*

equipment is set up to allow you to complete the task without complications") and an approach goal focus ("*try your upmost to score as highly as possible*"). For the threat instructions, we aimed to promote low self-efficacy ("*it is unlikely that you will have done a task like this before, so you obviously can't be sure that you will perform well*"), perceived control ("*complications are likely, as unavoidable nerves can majorly influence your throw*") and promote an avoidance goal focus ("*do try to avoid missing the poles*"). The manipulation of the identity leadership principles replicated Study 1 (see Supplementary file 1 for all instructions). Internal reliability was at least acceptable across all subscales of all measures ($\alpha \geq .792$).

Data analysis

Prior to main analyses, Shapiro Wilks tests were performed, noting significant outliers (Seery et al., 2008). Like Study 1, *z*-scores greater than two (Smith, 2011) were winsorized (4.84% of the dataset). Assessment of cardiovascular indices and inclusion of cardiovascular and performance change scores (baseline to performance) was consistent with Study 1. All multicollinearity, normality and outlier checks met the assumptions necessary for all data analysis.

Analyses assessing H3 and H4 involved two stages. First, assessing H3, 2 (identity leadership: IL vs. no IL) X 2 (appraisal: challenge vs. threat) between-subjects ANOVA's and MANOVA's were used to identify whether there was an interaction of identity leadership (IL vs. no IL) and appraisal instructions (challenge vs. threat) on resource appraisals, cardiovascular challenge and threat and motor performance. Gender was not used as a covariate for physiological challenge and threat variables due to an equal sample of males and females within each condition. Second, Pearson's correlations identified the association between identity leadership, resource appraisals, physiological challenge and threat and performance within the four conditions (see Table 4).

Results

Manipulation checks

Heart rate. Assessing task engagement, a paired samples *t*-test indicated that there was a significant increase in heart rate from baseline to post instructions in the sample, $t(119) = 33.62$, $p < .01$; $M_{bpm} = 9.21 \pm 13.09$. ANOVA indicated a main effect of condition on heart rate change, $F(3, 116) = 2.96$, $p = .035$. Though, Bonferroni adjusted pairwise comparisons identified that there was no significant difference in heart rate change between conditions ($M_{IL/challenge} = 9.43 \pm 2.22$; $M_{IL/threat} = 8.26 \pm 1.75$; $M_{no\ IL/challenge} = 10.05 \pm 2.95$; $M_{no\ IL/threat} = 8.59 \pm 3.07$; *p's* $\geq .181$).

Task importance. A one group *t*-test indicated that task importance was significantly different from 0, $t(119) = 70.75$, $p < .01$; $M = 4.23 \pm .65$. ANOVA identified that this difference did not vary as a function of condition, $F(3, 116) = 1.33$, $p = .269$, $M_{IL/challenge} = 4.40 \pm .50$; $M_{IL/threat} = 4.27 \pm .74$; $M_{no\ IL/challenge} = 4.13 \pm .68$; $M_{no\ IL/threat} = 4.10 \pm .66$.

Identity leadership. MANOVA indicated that there was a significant main effect of identity leadership (IL vs. no IL) on identity prototypicality, advancement, entrepreneurship, and impresarioship, Wilks' $\Lambda = .32$, $F(4, 113) = 60.37$, $p < .001$, $\eta^2_p = .68$. As expected, follow up comparisons identified that perceived leader prototypicality (IL: $M = 5.72 \pm .86$; no IL: $M = 2.54 \pm 1.41$), advancement (IL: $M = 5.58 \pm 1.03$; no IL: $M = 2.43 \pm 1.30$), entrepreneurship (IL: $M = 5.51 \pm 1.01$; no IL: $M = 2.73 \pm 1.47$) and impresarioship (IL: $M = 4.89 \pm 1.12$; no IL: $M = 2.55 \pm 1.55$) were significantly greater in the IL conditions than the no IL conditions, $p < .01$. Further, MANOVA indicated that there was a significant main effect of appraisal (challenge vs. threat) on identity prototypicality (challenge: $M = 4.30 \pm 1.86$; threat: $M = 3.95 \pm 2.08$), advancement (challenge: $M = 4.29 \pm 1.83$; threat: $M = 3.72 \pm 2.07$), entrepreneurship (challenge: $M = 4.38 \pm 1.74$; threat: $M = 3.85 \pm 1.98$) and impresarioship (challenge: $M = 3.86 \pm 1.61$; threat: $M = 3.58 \pm 1.95$), Wilks' $\Lambda = .90$, $F(4, 113) = 3.20$, $p = .016$, $\eta^2_p = .10$.

Follow up comparisons identified that perceived leader advancement (p = .008) and entrepreneurship (p = .021) were significantly greater in the challenge conditions than the threat conditions. There was a non-significant interaction of identity leadership (IL vs. no IL) and appraisal (challenge vs. threat) on identity leadership, Wilks' Λ = .97, F(4, 113) = .819, p = .516, η^2_p = .03.

Group identification. ANOVA revealed that group identification significantly varied as a function of identity leadership (IL vs. no IL), F(1, 116) = 72.52, p < .001, η^2_p = .39. Pairwise comparisons indicated that group identification was significantly greater in the IL (M = 5.4 ± 1.05) than the no IL conditions (M = 3.54 ± 1.37; p < .01). Group identification did not significantly differ as a function of appraisal (challenge vs. threat), F(1, 116) = 3.82, p = .053, η^2_p = .03. There was a non-significant interaction of leadership (IL vs. no IL) and appraisal (challenge vs. threat) on identification with the team, F(1, 116) = 3.46, p = .066, η^2_p = .03.

Main Analyses

Self-efficacy and control. ANOVA indicated that self-efficacy and control significantly varied as a function of identity leadership (IL vs. no IL), F(1, 116) ≥ 7.02, p ≤ .009, η^2_p ≥ .06. Follow up comparisons indicated that self-efficacy and control was significantly greater in the IL than the no IL conditions, p ≤ .009. ANOVA identified that self-efficacy and control did not significantly vary as a function of appraisal (challenge vs. threat), F(1, 116) ≤ 1.08, p ≥ .302, η^2_p ≤ .01, nor was there an interaction effect, F(1, 116) ≤ .57, p ≤ .73, η^2_p ≤ .01. Means and standard deviations of all main study variables in Study 2 can be found in Table 3.

Achievement goals. MANOVA indicated that there was a non-significant main effect of identity leadership (IL vs. no IL) on MAp, MAv, Pap, and PAv, Wilks' Λ = .93, F(4, 113) = 2.23, p = .070, η^2_p = .07. That said, follow up comparisons identified that perceived MAp and PAp were significantly greater in the IL than the no IL conditions, p ≤ .029. MANOVA indicated a non-significant main effect of appraisal (challenge vs. threat) on MAp, MAv, PAp

and PAv, Wilks' Λ = .98, $F(4, 113) = .54$, $p = .700$, $\eta^2_p = .02$, nor was there an interaction effect, Wilks' Λ = .96, $F(4, 113) = 1.14$, $p = .340$, $\eta^2_p = .04$.

Cardiovascular Challenge and Threat. ANOVA indicated that challenge and threat index did not significantly vary as a function of identity leadership (IL vs. no IL), $F(1, 116) = 1.78$, $p = .185$, $\eta^2_p = .02$. ANOVA indicated that challenge and threat index significantly varied as a function of appraisal (challenge vs. threat), $F(1, 116) = 5.78$, $p = .018$, $\eta^2_p = .05$. Follow up comparisons revealed that the challenge instructions resulted in a significantly greater physiological challenge state compared to the threat instructions, $p = .018$. There was a non-significant interaction of identity leadership (IL vs. no IL) and appraisal (challenge vs. threat) on CTI, Wilks' Λ = .97, $F(1, 116) = .571$, $p = .451$, $\eta^2_p = .01$ (see Figure 1).

[insert Figure 1]

Motor Performance. ANOVA revealed that performance score varied according to identity leadership (IL vs. no IL) from baseline to performance trial, $F(1, 116) = 10.40$, $p = .002$, $\eta^2_p = .08$. Follow up comparisons indicated that the IL condition significantly improved in performance scores from baseline in comparison to the no IL conditions, $p = .002$. ANOVA revealed that change in performance intention between IL and no IL conditions from baseline to performance trial was non-significant, $F(1, 116) = 3.33$, $p = .070$, $\eta^2_p = .03$. ANOVA indicated that performance score and intention did not significantly vary as a function of appraisal (challenge vs. threat), $F(1, 116) \leq 2.49$, $p \geq .118$, $\eta^2_p \leq .02$, nor was there an interaction effect, $F(1, 116) \leq 1.12$, $p \geq .29$, $\eta^2_p \leq .01$ (see Figure 2). All means and standard deviations of all main analysis variables can be found in Table 3. A correlation matrix of all study variables can be found in Tables 4 and 5.

Additional Analyses. Replicating previous research (Turner et al., 2013), CTI was coded 1 (Challenged) and 0 (Threatened). From this, independent samples *t*-tests, irrespective of condition, revealed that those who were physiologically challenged ($n = 56$) performed better

after baseline than those who were physiologically threatened, M = -.48 vs 2.46, p = .049, n = 64. Accounting for all CV data across the two studies (n = 280), a further independent samples t-test revealed that those who were physiologically challenged (n = 130) performed better after baseline than those who were physiologically threatened, M = -.07 vs 2.54, p = .026, n = 150).

[insert Figure 2]

[insert Table 3]

[insert Table 4]

[insert Table 5]

Discussion

Study 2 showed mixed support for H3 and H4. The experimental manipulation of identity leadership principles (vs. no IL) induced greater challenge appraisals (H3) and motor performance (H4). That said, challenge instructions positively influenced cardiovascular reactivity (H3), not identity leadership. In contrast to H3, the perception of identity leadership (vs. no IL) did not exacerbate anticipated appraisals or cardiovascular reactivity. Rather, we found that compared to a lack of identity leadership, the enactment of identity leadership induced greater resource appraisals, irrespective of the challenge and threat manipulations. These findings suggest that the enactment of identity leadership principles buffer against the negative effect of ego-threat (see Turner et al., 2014), enhancing likelihood of adaptive appraisals. However, aligned with previous research (Turner et al., 2014), it was the challenge and threat instructions which predicted CV stress reactivity. Further, inconsistent with H4, only identity leadership instructions influenced motor performance. Overall, contrary to our expectations, Study 2 data did not indicate that cardiovascular states (challenge or threat) become more pronounced when instructions are delivered by a leader who leads in-line with identity principles (vs. not).

General Discussion

In this programme of research we sought to examine whether perceptions of identity leadership (IL vs. no IL; Study 1), and their interaction with challenge and threat appraisal instructions (Study 2), influenced followers' resource appraisals, physiological challenge and threat states, and motor performance on a pressurised motor task. In sum, self-report, CV, and motor performance measures indicated mixed support for our hypotheses. Supporting H1 and H2, no identity leadership led to poorer resource appraisals, physiological states, and motor performance relative to the enactment of identity leadership. That said, a lack of identity leadership did not lead to a) maladaptive appraisals of the event, nor b) a cardiovascular threat state (e.g. Slater et al., 2018; see Table 1 and 3). Instead, we found that in comparison to no identity leadership, when instructed by an individual encouraging high levels of identity leadership, participants reported greater self-efficacy, control, mastery (approach and avoidance) goals, challenge CV reactivity and motor performance (H1 and H2). No such results were identified for performance intention. In contrast to H3, there was no interaction effect in Study 2, indicating that identity leadership did not exacerbate psychophysiological challenge and threat. Instead, there was a main effect of identity leadership (IL vs. no IL) on resource appraisals. In addition, compared to threat instructions, challenge instructions led to greater physiological challenge states on approach to a motivated performance situation. In contrast to H4, identity leadership did not interact with challenge appraisal instructions in improving motor performance. Instead, compared to a lack of identity leadership, leading in-line with the four identity leadership principles positively influenced pressurised motor performance. Specifically, when delivering threat instructions alongside no identity leadership, performance deteriorates. However, when delivering challenge instructions alongside no identity leadership, performance is not likely to drop. Conversely, identity leadership instructions, alongside both challenge and threat instruction, is conducive to

positive performance. Here it is evident that a) identity leadership can positively influence performance even when threat instructions are given, and b) a lack of identity leadership is not necessarily detrimental to performance when challenge instructions are delivered (see Figure 2).

Across both studies, the findings identify that the experimental manipulation of identity leadership positively influences self-efficacy, perceived control, approach goals, cardiovascular challenge states (Study 1 only), and motor performance. Research by Slater and colleagues (2018) found that identification with a leader serves to bolster resource appraisals and cognitive functioning. However, authors found limited results with regard to cardiovascular indices of challenge and threat. Specifically, Slater and colleagues (2018) found that low relational identification leads to a threat response, whilst greater identification does not necessarily lead to a challenge response. Building on Slater and colleagues' (2018) findings, in Study 1 we identified that the enactment of identity leadership induces a challenge state, whilst no enactment does not necessarily lead to a threat state. That said, this finding did not emerge in Study 2. We identified a main effect for challenge and threat instructions only, and no influence of identity leadership on CV states in Study 2. Given the theoretical link between resource appraisals and CV states (Jones et al., 2009), it would be expected that challenge instructions would lead to challenge CV states.

Critically, Study 2's findings can be viewed in two clusters in that: (1) identity leadership influenced resource appraisals and performance on a pressurised task; and (2) challenge and threat instructions influenced participants' physiological reactivity to the task. Extending current knowledge, participants in the identity leadership-challenge condition were not more challenged as a result of being led by an individual enacting the identity leadership principles, nor did participants in the threat condition become more threatened as a result of identity leadership. Contributing to leadership (Haslam et al., 2020) and stress theory (Jones

et al., 2009), appraisals of an event were influenced by identity leadership alone, with the enactment of the four principles (see Haslam et al., 2020; Steffens et al., 2014) proving adaptive for approach goals (both mastery and performance), self-efficacy and perceived control. CV states (challenge and threat) were influenced by the challenge and threat instructions only, not influenced by identity leadership.

Collectively, our findings have important implications for leadership and stress theory. Advancing the social identity approach to leadership (see Haslam et al 2020; Hogg, 2001), Study 1 and 2 identified that the manipulation of the identity leadership principles influenced follower self-efficacy, perceived control and approach valence towards a motivated performance situation. Identity leadership was also found to be adaptive for cardiovascular challenge states (Study 1). These findings provide support for the positive influence of social resources (friends; memberships in clubs and organizations) in attenuating stressful situations (Billings & Moos, 1981). These social resources positively influence performances as a result of collective supportive climates (Peñalver et al., 2019), which are products of leadership (Fransen et al., 2017; Zhu et al., 2015). In addition, these findings are in-line with the sociopsychobio proposition that social factors influence and shape psychological and biological parameters of group members (Haslam et al., 2019). Within the sociopsychobio debate it is posited that an appraisal of an event (i.e. a cup final) is shaped by a salient group-member (i.e., the coach) who then influences follower physiological stress reactivity (Haslam et al., 2019). Broadly, our programme of research adds weight to the position that social variables inform psychological and physiological responses to stress.

Practical implications

CV reactivity to stressors can have implications for health (Kivimäki et al., 2012). Because leadership is an integral element that can define the extent of a stressor (e.g., a cup final), findings such as this can shape sport performance environments. Stress is ubiquitous in

leadership and sport performance situations. With evidence that leadership plays a pivotal role in influencing psychophysiological stress and performance, coaches should aim to endorse the qualities that define the group that they lead, advance and promote the core interests of the group, bring the group together by creating a shared sense of "we" and "us", and organise events and activities that give weight to the group's existence. In doing this, athletes are likely to cope better when approaching competitive performance situations as a result of greater identification (i.e. with the team; Haslam et al., 2020). An athlete can draw on support from an individual they identify with (e.g., a coach), and seek to use these opportunities for support from a coach in anticipation of a motivated performance situation, bolstering positive psychophysiological stress and performance.

Limitations and future research directions

The current research is not without its limitations. Although an integral part of the TCTSA, the leadership situations in Study 1 and 2 hinge on an acute task, only drawing implications for acute stressors. Although the influence of identity leadership has been found to stimulate immediate change within previous research (Stevens et al., 2019), an extensive period of time was not given to the participants to accrue any long-term stressful reactions in the run up to the event. There would be merit in identifying how identity leadership, namely the embodiment of the four principles, influence psychophysiological stress reactivity temporally, using accessible, manoeuvrable equipment such as an ambulatory Finapres. With social support now incorporated within novel stress theory (Meijen et al., 2020), it would also be fruitful to evidence whether the enactment of social support from a leader whom an individual identifies with can influence psychophysiological stress and performance. It is also worth noting that a) the leader was presented as a male (i.e., John), and b) the faces of the leader and team was not shown. Perceptions of a leader can be influenced by their gender (Crites et al., 2015). To minimize this influence, strengthening the validity of the current

findings, the leader and team was presented using an audio to avoid implicit biases and perceptions of both (Willis & Todorov, 2006), being typical practice within challenge and threat research (Turner et al., 2014). Whilst the manipulations of identity leadership are explicit (IL vs. no IL) and therefore challenge ecological validity, these manipulations aligned with typical research convention in assessing two polarized constructs (e.g., irrational vs rational leaders' speeches; Evans et al., 2018; leader entrepreneurship vs no leader entrepreneurship; Stevens et al., 2019). Further, the manipulations aligned with the four theorized identity leadership principles (Haslam et al., 2020), eliciting group identification (i.e., via the manipulation checks) without introducing potential confounds such as faces of other newly introduced team members (i.e., initial impressions; Willis & Todorov, 2006). Regarding group identification, it may the case that identity leadership may not necessarily be required for identification to occur (i.e., gender of leader influencing identification; Tsui & O'reilly, 1989). That said, research has evidenced the importance of identity leadership behaviours on influencing likelihood of group identification (Miller et al., 2020; Steffens et al., 2014, Study 2; Steffens et al., 2019; Stevens et al., 2018). Finally, regarding the task, although lab-based and lacking realism, the task mimicked a competitive scenario that requires a decision on how best to score points, enhancing likeness to a real-world scenario. This said, future researchers should look to measure real-life performance in natural pressurised environments.

Conclusion

In this programme of research, we aimed to examine whether and to what extent perceived identity leadership influenced followers' psychophysiological stress reactivity and motor performance (Study 1), and whether identity leadership interacted with challenge and threat instructions (Study 2) to determine psychophysiological stress reactivity and motor performance. We found that the experimental manipulation of identity leadership positively

influenced resource appraisals, cardiovascular challenge states, and motor performance. In turn, those in a position to influence should endeavour to endorse follower group identification through the enactment of the four identity leadership principles, which in turn will enhance efficacy, perceived control, approach focus, avoidance focus, cardiovascular reactivity and performance within stressful situations. In sum, leaders should be acutely aware of how they are perceived by their followers due to the implications this can have on follower psychophysiological challenge and threat responses to stress and performance.

References

Bandura, A. (2006). Guide for constructing self-efficacy scales. *Self-efficacy Beliefs of Adolescents*, *5*(1), 307-337.

Behnke, M., & Kaczmarek, L. D. (2018). Successful performance and cardiovascular markers of challenge and threat: A meta-analysis. *International Journal of Psychophysiology*, *130*, 73-79.

Billings, A. G., & Moos, R. H. (1981). The role of coping responses and social resources in attenuating the stress of life events. *Journal of Behavioral Medicine*, *4*(2), 139-157.

Blascovich, J., & Mendes, W. B. (2000). *Challenge and threat appraisals: The role of affective cues*. In J. Forgas (Ed.), Feeling and thinking: The role of affect in social cognition (pp. 59–82).

Blascovich, J., Mendes, W. B., Tomaka, J., Salomon, K., & Seery, M. (2003). The robust nature of the biopsychosocial model challenge and threat: A reply to Wright and Kirby. *Personality and Social Psychology Review*, *7*(3), 234-243. https://doi.org/10.1207/S15327957PSPR0703_03

Blascovich, J., Seery, M. D., Mugridge, C. A., Norris, R. K., & Weisbuch, M. (2004). Predicting athletic performance from cardiovascular indexes of challenge and

threat. *Journal of Experimental Social Psychology*, *40*(5), 683-688. https://doi.org/10.1016/j.jesp.2003.10.007

Charness, G., Gneezy, U., & Kuhn, M. A. (2012). Experimental methods: Between-subject and within-subject design. *Journal of Economic Behavior & Organization*, *81*(1), 1-8.

Crites, S. N., Dickson, K. E., & Lorenz, A. (2015). Nurturing gender stereotypes in the face of experience: A study of leader gender, leadership style, and satisfaction. *Journal of Organizational Culture, Communications and Conflict*, *19*(1), 1-23.

Conroy, D. E., Elliot, A. J., & Hofer, S. M. (2003). A 2× 2 achievement goals questionnaire for sport: Evidence for factorial invariance, temporal stability, and external validity. *Journal of Sport and Exercise Psychology*, *25*(4), 456-476. https://doi.org/10.1123/jsep.25.4.456

Dienstbier, R. A. (1989). Arousal and physiological toughness: implications for mental and physical health. *Psychological Review*, *96*(1), 84-100. http://dx.doi.org/10.1037/0033-295X.96.1.84

Evans, A. L., Turner, M. J., Pickering, R., & Powditch, R. (2018). The effects of rational and irrational coach team talks on the cognitive appraisal and achievement goal orientation of varsity football athletes. *International Journal of Sports Science & Coaching*, *13*(3), 431-438. https://doi.org/10.1177/1747954118771183

Fransen, K., Haslam, S. A., Steffens, N. K., Vanbeselaere, N., De Cuyper, B., & Boen, F. (2015). Believing in "us": Exploring leaders' capacity to enhance team confidence and performance by building a sense of shared social identity. *Journal of Experimental Psychology: Applied*, 21(1), 89-100.

Freeman, N. E., Shaw, J. L., & Snyder, J. C. (1936). The peripheral blood flow in surgical shock: The Reduction in Circulation through the Hand Resulting from Pain, Fear, Cold, and Asphyxia, with Quantitative Measurements of the Volume Flow of Blood

in Clinical Cases of Surgical Shock. *The Journal of Clinical Investigation*, *15*(6), 651-664. https://doi.org/10.1172/JCI100817

Giessner, S. R., & van Knippenberg, D. (2008). "License to fail": Goal definition, leader group prototypicality, and perceptions of leadership effectiveness after leader failure. *Organizational Behavior and Human Decision Processes*, *105*(1), 14-35. https://doi.org/10.1016/j.obhdp.2007.04.002

Greenwald, A. G. (1976). Within-subjects designs: To use or not to use?. *Psychological Bulletin*, *83*(2), 314-320. http://dx.doi.org/10.1037/0033-2909.83.2.314

Haslam, S. A. (2004). *Psychology in organizations: the social identity approach* (2nd ed.). Thousand Oaks, CA: Sage publications.

Haslam, S. A., Fransen, K., & Boen, F. (2020). *The new psychology of Sport and Exercise: The social identity approach*. SAGE Publications Ltd.

Haslam, S. A., Haslam, C., Jetten, J., Cruwys, T., & Bentley, S. (2019). Group life shapes the psychology and biology of health: The case for a sociopsychobio model. *Social and Personality Psychology Compass*, 1-16. https://doi.org/10.1111/spc3.12490

Haslam, S. A., Jetten, J., Postmes, T., & Haslam, C. (2009). Social Identity, Health and Well-Being: An Emerging Agenda for Applied Psychology. *Applied Psychology*, *58*(1), 1-23. https://doi.org/10.1111/j.1464-0597.2008.00379.x

Haslam, S. A., & Reicher, S. (2006). Stressing the group: social identity and the unfolding dynamics of responses to stress. *Journal of Applied Psychology*, *91*(5), 1037–1052. https://doi.org/10.1037/0021-9010.91.5.1037

Haslam, A. S., Reicher, S. D., & Levine, M. (2012). When other people are heaven, when other people are hell: how social identity determines the nature and impact of social support. In J. Jetten, C. Haslam, A., S. Haslam (Eds.), *The Social Cure: Identity, Health and Well-Being* (pp. 157-174). London: Psychology Press.

Häusser, J. A., Kattenstroth, M., van Dick, R., & Mojzisch, A. (2012). “We” are not stressed: Social identity in groups buffers neuroendocrine stress reactions. *Journal of Experimental Social Psychology*, *48*(4), 973-977. https://doi.org/10.1016/j.jesp.2012.02.020

Hogg, M. A. (2001). A social identity theory of leadership. *Personality and Social Psychology Review*, *5*(3), 184-200. https://doi.org/10.1207/S15327957PSPR0503_1

Jones, M., Meijen, C., McCarthy, P. J., & Sheffield, D. (2009). A theory of challenge and threat states in athletes. *International Review of Sport and Exercise Psychology*, *2*(2), 161-180. https://doi.org/10.1080/17509840902829331

Keren, G. (2014). Between-or within-subjects design: A methodological dilemma. *A Handbook for Data Analysis in the Behaviorial Sciences*, *1*, 257-272.

Kivimäki, M., Nyberg, S. T., Batty, G. D., Fransson, E. I., Heikkilä, K., Alfredsson, L., ... & Clays, E. (2012). Job strain as a risk factor for coronary heart disease: a collaborative meta-analysis of individual participant data. *The Lancet*, *380*(9852), 1491-1497. https://doi.org/10.1016/S0140-6736(12)60994-5

Krog, J., Folkow, B., Fox, R. H., & Andersen, K. L. (1960). Hand circulation in the cold of Lapps and North Norwegian fishermen. *Journal of Applied Physiology*, *15*(4), 654-658. https://doi.org/10.1152/jappl.1960.15.4.654

Meijen, C., Turner, M., Jones, M. V., Sheffield, D., & McCarthy, P. (2020). A theory of challenge and threat states in athletes: A revised conceptualization. *Frontiers in psychology*, *11*, 126. https://doi.org/10.3389/fpsyg.2020.00126

Miller, A. J., Slater, M. J., & Turner, M. J. (2020) Coach identity leadership behaviours are positively associated with athlete resource appraisals: The mediating roles of relational and group identification. *Psychology of Sport and Exercise*. https://doi.org/10.1016/j.psychsport.2020.101755

Moore, L. J., Vine, S. J., Wilson, M. R., & Freeman, P. (2012). The effect of challenge and threat states on performance: An examination of potential mechanisms. *Psychophysiology*, *49*(10), 1417-1425. https://doi.org/10.1111/j.1469-8986.2012.01449.x

Peñalver, J., Salanova, M., Martínez, I. M., & Schaufeli, W. B. (2019). Happy-productive groups: How positive affect links to performance through social resources. *The Journal of Positive Psychology*, *14*(3), 377-392. https://doi.org/10.1080/17439760.2017.1402076

Perry, R. P., Hladkyj, S., Pekrun, R. H., & Pelletier, S. T. (2001). Academic control and action control in the achievement of college students: A longitudinal field study. *Journal of Educational Psychology*, *93*(4), 776-789. https://doi.org/10.1037/0022-0663.93.4.776

Rees, T., Haslam, S. A., Coffee, P., & Lavallee, D. (2015). A social identity approach to sport psychology: Principles, practice, and prospects. *Sports medicine*, *45*(8), 1083-1096. https://doi.org/10.1007/s40279-015-0345-4

Schinke, R. J., Mellalieu, S., Ntoumanis, N., Kavussanu, M., Standage, M., Strauss, B., & Papaioannou, A. (2020). Getting Published: Suggestions and Strategies from Editors of Sport and Exercise Psychology Journals. *Journal of Applied Sport Psychology*, 1-23. https://doi.org/10.1080/10413200.2020.1741725

Seery, M. D., West, T. V., Weisbuch, M., & Blascovich, J. (2008). The effects of negative reflection for defensive pessimists: Dissipation or harnessing of threat?. *Personality and Individual Differences*, *45*(6), 515-520. https://doi.org/10.1016/j.paid.2008.06.004

Sherwood, A., & Turner, J. R. (1993). Postural stability of hemodynamic responses during mental challenge. *Psychophysiology*, *30*(3), 237-244. https://doi.org/10.1111/j.1469-8986.1993.tb03349.x

Slater, M. J., Turner, M. J., Evans, A. L., & Jones, M. V. (2018). Capturing hearts and minds: The influence of relational identification with the leader on followers' mobilization and cardiovascular reactivity. *The Leadership Quarterly*, *29*(3), 379-388. https://doi.org/10.1016/j.leaqua.2017.08.003

Sluss, D. M., & Ashforth, B. E. (2007). Relational identity and identification: Defining ourselves through work relationships. *Academy of Management Review*, *32*(1), 9-32. https://doi.org/10.5465/amr.2007.23463672

Smith, M. (2011). *Research methods in accounting* (2nd ed.). London: SAGE Publications Ltd.

Steffens, N. K., Haslam, S. A., Reicher, S. D., Platow, M. J., Fransen, K., Yang, J., ... & Boen, F. (2014). Leadership as social identity management: Introducing the Identity Leadership Inventory (ILI) to assess and validate a four-dimensional model. *The Leadership Quarterly*, *25*(5), 1001-1024. https://doi.org/10.1016/j.leaqua.2014.05.002

Steffens, N. K., Slade, E. L., Stevens, M., Haslam, S. A., & Rees, T. (2019). Putting the 'we' into workout: The association of identity leadership with exercise class attendance and effort, and the mediating role of group identification and comfort. *Psychology of Sport and Exercise*, *45*, 101544. https://doi.org/10.1016/j.psychsport.2019.101544

Stevens, M., Rees, T., Coffee, P., Haslam, S. A., Steffens, N. K., & Polman, R. (2018). Leaders promote attendance in sport and exercise sessions by fostering social identity. *Scandinavian Journal of Medicine & Science in Sports*, *28*(9), 2100-2108. https://doi.org/10.1111/sms.13217

Stevens, M., Rees, T., Steffens, N. K., Haslam, S. A., Coffee, P., & Polman, R. (2019). Leaders' creation of shared identity impacts group members' effort and performance: Evidence from an exercise task. *PloS one*, *14*(7), e0218984. https://doi.org/10.1371/journal.pone.0218984

Stoney, C. M., Davis, M. C., & Matthews, K. A. (1987). Sex differences in physiological responses to stress and in coronary heart disease: a causal link?. *Psychophysiology*, *24*(2), 127-131. https://doi.org/10.1111/j.1469-8986.1987.tb00264.x

Tajfel, H. (1972). Social categorisation. English manuscript of "La categorisation sociale". In S. Moscovici (Ed.), *Introduction à la Psychologie Sociale* (Vol. 1, pp. 272-302). Paris: Larosse.

Tajfel, H., & Turner, J. C. (1979). *An integrative theory of intergroup conflict*. In W. G. Austin, & S. Worchel (Eds.), The social psychology of intergroup relations (pp. 33-37). Monterey, CA: Brooks/Cole.

Tomaka, J., Blascovich, J., Kibler, J., & Ernst, J. M. (1997). Cognitive and physiological antecedents of threat and challenge appraisal. *Journal of Personality and Social Psychology*, *73*(1), 63-72. http://dx.doi.org/10.1037/0022-3514.73.1.63

Tsui, A. S., & O'reilly, C. A. (1989). Beyond simple demographic effects: The importance of relational demography in superior-subordinate dyads. *Academy of Management Journal*, *32*(2), 402-423.

Turner, J. C., Hogg, M. A., Oakes, P. J., Reicher, S. D., & Wetherell, M. S. (1987). *Rediscovering the social group: A self-categorization theory*. Basil Blackwell.

Turner, M. J., Jones, M. V., Sheffield, D., Barker, J. B., & Coffee, P. (2014). Manipulating cardiovascular indices of challenge and threat using resource appraisals. *International*

Journal of Psychophysiology, *94*(1), 9-18. https://doi.org/10.1016/j.ijpsycho.2014.07.004

Turner, M. J., Jones, M. V., Sheffield, D., & Cross, S. L. (2012). Cardiovascular indices of challenge and threat states predict competitive performance. *International Journal of Psychophysiology*, *86*(1), 48-57. https://doi.org/10.1016/j.ijpsycho.2012.08.004

Turner, M. J., Jones, M. V., Sheffield, D., Slater, M. J., Barker, J. B., & Bell, J. J. (2013). Who thrives under pressure? Predicting the performance of elite academy cricketers using the cardiovascular indicators of challenge and threat states. *Journal of Sport and Exercise Psychology*, *35*(4), 387-397. https://doi.org/10.1123/jsep.35.4.387

van Dick, R., Lemoine, J. E., Steffens, N. K., Kerschreiter, R., Akfirat, S. A., Avanzi, L., ... & González, R. (2018). Identity leadership going global: Validation of the Identity Leadership Inventory across 20 countries. *Journal of Occupational and Organizational Psychology*. https://doi.org/10.1111/joop.12223

Weinstein, N., Zougkou, K., & Paulmann, S. (2018). You 'have'to hear this: Using tone of voice to motivate others. *Journal of Experimental Psychology: Human Perception and Performance*, *44*(6), 898- 913. https://doi.org/10.1037/xhp0000502

White, C. A., Slater, M. J., Turner, M. J., & Barker, J. B. (2020). More positive group memberships are associated with greater resilience in Royal Air Force (RAF) personnel. *British Journal of Social Psychology*. https://doi.org/10.1111/bjso.12385

Willis, J., & Todorov, A. (2006). First impressions: Making up your mind after a 100-ms exposure to a face. *Psychological science*, *17*(7), 592-598. https://doi.org/10.1111/j.1467-9280.2006.01750.x

Zhu, W., He, H., Treviño, L. K., Chao, M. M., & Wang, W. (2015). Ethical leadership and follower voice and performance: The role of follower identifications and entity

morality beliefs. *The Leadership Quarterly*, *26*(5), 702-718.

https://doi.org/10.1016/j.leaqua.2015.01.004

Figures

Figure 1. Challenge and threat index for the 2 (Identity leadership: IL vs no IL) X 2 (Appraisal: Challenge vs Threat) design.

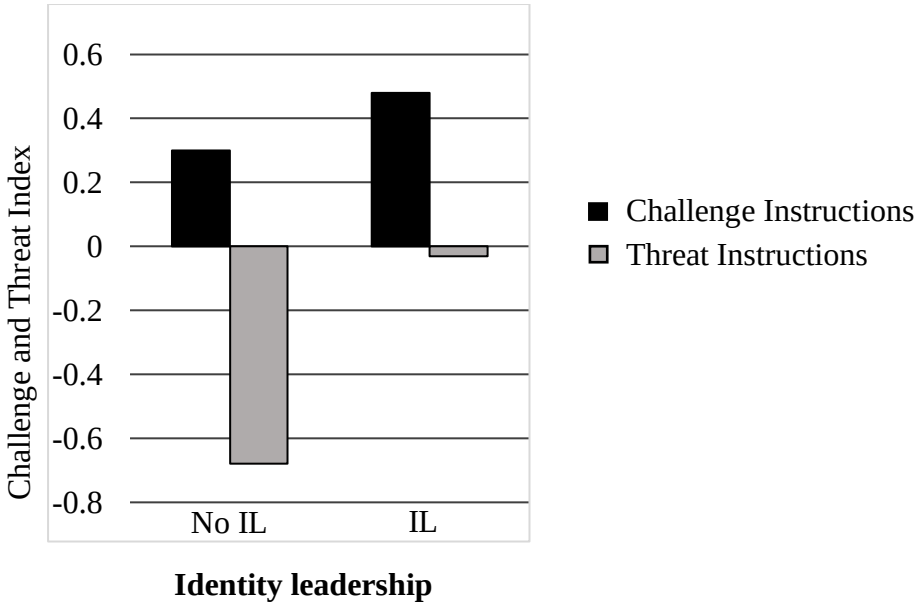
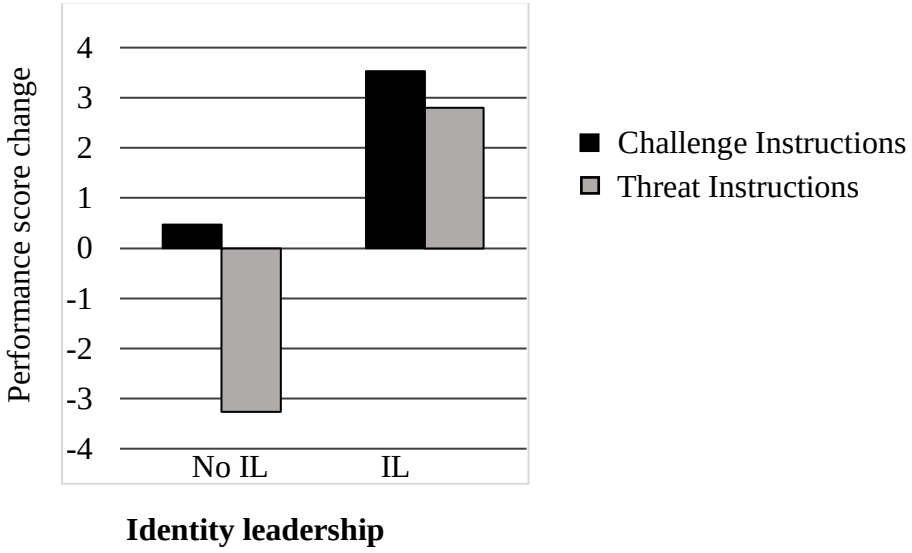


Figure 2. Performance score change for the 2 (Identity leadership: IL vs. no IL) X 2 (Instructions: Challenge vs Threat) design.



Tables

Table 1. Means and standard deviations of all Study 1 main analyses variables post condition instructions.

	No identity leadership	Identity leadership
Control*	4.02 ± .76	4.19 ± .73
Mastery Approach**	5.46 ± 1.3	5.94 ± 1.01
Mastery Avoidance*	3.54 ± 1.57	3.89 ± 1.58
Performance Approach	4.71 ± 1.51	4.71 ± 1.61
Performance Avoidance	4.1 ± 1.83	4.09 ± 1.81
Self-efficacy*	3.49 ± .64	3.69 ± .78
Challenge-threat index**	-.01 ± 1.37	.52 ± .94
Performance score change**	-1.98 ± 9.51	4.63 ± 11.23
Performance intention change	3.03 ± 8.16	3.04 ± 9.13

Note: $p \leq .05$, $p \leq .01$***

Table 2. Pearson's correlations coefficients (*r*) between the variables across both conditions (IL vs. no IL)

1. Prototypical	-	.80*	79*	.54*	.46*	.25**	.05	.32*	.11	.43*	.22**	-.01	.07	-.04
2. Advancement	.82*	-	.84*	.56*	.42*	.26**	.05	.40*	.13	.44*	.129	-.13	.17	.05
3. Entrepreneur	.77*	.80*	-	.62*	.38*	.27**	.14	.41*	.16	.33*	.15	-.08	.13	-.02
4. Impresario	.79*	.78*	.73*	-	.40*	.19	.02	.15	.09	.13	.08	-.03	.03	.02
5. Group Identification	.34*	.46*	.49*	.50*	-	.31*	.18	.25**	.08	.16	.01	.02	-.12	-.04
6. Self-efficacy	.05	-.06	.03	-.06	.01	-	.35*	.58*	.15	.46*	.06	.17	.05	-.01
7. Control	.14	.23**	.19	.20	.33*	.29**	-	.46*	.11	.10	.16	.01	.02	.03
8. MAp	.15	.10	.26**	.12	.21	.38*	.40*	-	.21	.52*	.14	.06	.02	-.11
9. MAv	.11	.21	.23**	.10	.32*	-.20	.02	.43*	-	.28*	.36*	-.00	-.01	.08
10. PAp	.16	.18	.18	.13	.02	.37*	.19	.48*	.23**	-	.40*	.15	.07	.02
11. PAv	.14	.18	.10	.22**	-.04	-.17	.06	.09	.29*	.34*	-	-.06	.03	-.06
12. CTI	-.02	-.10	-.09	-.03	-.15	-.03	-.12	-.12	-.09	-.07	-.13	-	.09	-.01
13. Score	-.11	-.11	.00	.07	.26**	.00	.20	.09	.07	-.11	-.03	-.12	-	.08
14. Intention	.41*	.45*	.42*	.48*	.16	-.07	.25**	.22	.05	.01	-.03	.11	.09	-

Note: No identity leadership correlations are below the diagonal, and Identity leadership correlations are above the diagonal. $p \leq .05$**, $p < .01$*

Table 3. Means and standard deviations of all Study 2 variables across the four conditions.

	No identity leadership challenge	No identity leadership threat	Identity leadership challenge	Identity leadership threat
Mastery Approach	5.47 ± .97	5.70 ± .95	6.20 ± .81	5.90 ± 1.03
Mastery Avoidance	4.10 ± 1.65	4.23 ± 1.43	3.80 ± 1.49	4.37 ± 1.71
Performance Approach	4.90 ± 1.21	4.67 ± 1.63	5.37 ± 1.35	5.30 ± 1.21
Performance Avoidance	4.63 ± 1.59	4.60 ± 1.54	4.53 ± 1.57	4.97 ± 1.81
Self-efficacy	3.28 ± .70	3.10 ± .81	3.68 ± .69	3.70 ± .69
Control	3.77 ± .86	3.67 ± .92	4.20 ± .71	4.00 ± .64
Challenge-threat index	.30 ± 1.82	-.68 ± 1.50	.48 ± 1.64	-.03 ± 1.83
Performance score change	.47 ± 6.40	-3.27 ± 8.98	3.53 ± 8.25	2.80 ± 7.14
Performance intention change	2.87 ± 8.50	2.07 ± 10.04	5.80 ± 12.82	5.87 ± 8.45

Table 4. Pearson's correlations coefficients (*r*) between the variables across identity leadership conditions

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Prototypical	-	.48*	51*	.28	.35	.01	.25	.28	.13	.24	.09	.02	-.06	.05
2. Champion	.92*	-	.50*	.25	.51*	.37**	.33	.21	-.30	.11	-.21	-.10	-.17	-.04
3. Entrepreneur	.85*	.88*	-	.57*	.47*	.08	.35	.17	.04	-.03	-.21	-.10	-.02	-.07
4. Embedder	.73*	.81*	.90*	-	.54*	.17	.18	.16	-.10	.05	-.17	-.17	-.15	-.22
5. Team Identification	.29	.35*	.43**	.45**	-	.52*	.36	.37**	-.19	.31	-.16	-.18	-.34	-.04
6. Self-efficacy	.32	.25	.41**	.45**	67*	-	.41**	.49*	-.21	.48*	-.13	.03	-.09	.19
7. Control	.51*	.48*	.52*	.46**	.42**	.62*	-	.59*	-.38	.42**	-.01	-.15	-.07	.14
8. MAp	.46*	.45**	.54*	.48*	.51*	.64*	.57*	-	-.28	.66*	-.17	.02	-.13	.09
9. MAv	.18	.13	.13	-.06	.31	-.02	.22	.12	-	-.03	.52*	-.06	.19	-.11
10. PAp	.07	.17	.29	.36	.49*	.34	27	.50*	.16	-	.17	.06	-.01	.02
11. PAv	.31	.23	.19	.06	-.04	-.08	.09	.07	.49*	.08	-	.15	.30	.18
12. CTI	.09	.14	.15	.26	.18	.03	.18	-.01	.04	-.07	-.21	-	.53*	.52*
13. Score	.40**	.23	.37**	.29	.14	.43**	.23	.45**	.15	.05	.10	.00	-	.61*
14. Intention	-.08	-.04	.17	.05	.01	.20	.20	.27	.11	.38**	.19	-.44*	.07	-

Note: Identity leadership-threat correlations are below the diagonal, and Identity leadership-challenge correlations are above the diagonal. $p \leq .05$**, $p < .01$*

Table 5. Pearson's correlations coefficients (*r*) between the variables across no identity leadership conditions

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Prototypical	-	.89*	.76*	59*	.60*	.11	-.09	.14	-.13	.04	.24	-.19	-.03	.11
2. Advancement	.95*	-	.83*	.73*	.63*	.16	-.05	.15	-.22	.15	.07	-.05	.11	.22
3. Entrepreneur	.91*	.92*	-	.79*	.62*	.20	.11	.45**	-.02	.27	.09	-.09	.08	.26
4. Impresario	.80*	.81*	.94*	-	.65*	.01	.14	.27	-.06	.15	.08	-.09	.19	.28
5. Team Identification	.65*	.64*	.62*	.64*	-	.08	.05	.36	-.13	.22	-.05	-.14	-.01	.17
6. Self-efficacy	.08	-.05	.04	.12	.22	-	.63*	.43**	-.28	.13	-.28	-.03	.15	-.20
7. Control	.13	.06	.18	.17	.07	.46**	-	.47*	-.03	.20	-.29	.11	.02	-.25
8. MAp	.11	.03	.11	.10	-.03	.15	.43**	-	.36	.44**	.16	.04	-.17	-.26
9. MAv	-.33	-.35	-.43	-.38	-.27	.04	-.28	.05	-	.63*	.44**	-.06	-.17	-.10
10. PAp	-.02	-.08	-.15	-.08	.07	.39**	-.15	.38**	.36	-	.09	.42**	-.22	-.20
11. PAv	.13	.07	.02	.08	.15	.17	-.17	-.13	.54*	.37**	-	-.21	-.38*	-.06
12. CTI	-.21	-.25	-.21	-.21	-.26	-.17	-.19	-.03	-.08	-.19	-.11	-	.04	-.09
13. Score	-.33	-.30	-.34	-.29	-.13	.16	-.04	-.15	.15	.11	.02	.00	-	.21
14. Intention	.12	.15	.18	.16	.25	-.24	-.09	-.14	-.11	-.12	.05	-.14	-.10	-

Note: No identity leadership-threat correlations are below the diagonal, and no identity leadership-challenge correlations are above the diagonal. $p \leq .05$**, $p < .01$*

Appendix S1: *Conditions for the identity leadership conditions in Study 1.*

Identity leadership

Hello. My name is John. In a few moments you will complete a ring toss throwing task as part of a team. You will sit 1 metre away from the targets and must throw the ring onto the targets 10 times. The further away the target, the higher you will score. The maximum you can score is 100 points. The task will be video recorded and will be done in-front of the researcher. Your scores on the task, along with everyone else's scores, will generate a league table from best performers to worst performers, and this will be emailed to all participants at the conclusion of the study. Because everyone will see your scores it is important for you to do well in this difficult throwing task. You must try very hard to do well on this task. I will be your leader for this task, and you are in my team. I will represent the qualities that define our team and what it means to be a member of our team. I know what makes this team special and distinct from other teams. I will be an exemplary and model member of our team. I will promote the interests of our team, standing up for our team's interests. I'll champion these ambitions we have that are key to our team as a whole. I will bring us together as a team. We will all feel part of the same group, knowing our core values, norms, and ideals. To achieve our goals, I will create structures that will allow us all to achieve success as a team. We will achieve, and we will show other teams that we matter. Please keep as still as you can for 2-minutes while you think about the upcoming ring toss task, and we collect some cardiovascular data.

No identity leadership

Hello. My name is John. In a few moments you will complete a ring toss throwing task as part of a team. You will sit 1 metre away from the targets and must throw the ring onto the targets 10 times. The further away the target, the higher you will score. The maximum you can score is 100 points. The task will be video recorded and will be done in-front of the researcher. Your scores on the task, along with everyone else's scores, will generate a league table from best performers to worst performers, and this will be emailed to all participants at the conclusion of the study. Because everyone will see your scores it is important for you to do well in this difficult throwing task. You must try very hard to do well on this task. I will be your leader for this task, and you are in my team. Even though I lead our team, I do not represent or know the qualities that define our team nor what it means to be a member of this team. I do not know what makes this team special and distinct from other teams. As such, I will not be able to be an exemplary and model member of our team. Because of this, I will not promote the interests of the team, nor will I be able to stand up for the team's interests. I will not be able to champion the team's ambitions. I will not be able to bring us together as a team. We may not feel part of the same group, as I don't know your core values, norms, and ideals. I will not be able to create structures that will allow us all to achieve success. Please keep as still as you can for 2-minutes while you think about the upcoming ring toss task, and we collect some cardiovascular data.

Appendix S2: *Manipulations for the 2 (high vs. low identity leadership) x 2 (challenge vs. threat instructions) design in Study 2.*

Identity leadership challenge instructions

Hello. My name is John. In a few moments you will complete a ring toss throwing task as part of a team. Whilst seated facing the targets in front of you, you must throw the ring onto the targets 10 times. The further away the target, the higher you will score. The maximum you can score is 100 points. You will have performed similar actions in the past. Because of this experience, you can feel confident that you will score highly. We would like you to try your upmost to score as highly as possible. The equipment is set up to allow you to complete the task without complications. The task will be video recorded and will be done in-front of the researcher. Your scores on the task, along with everyone else's scores, will generate a league table from best performers to worst performers, and this will be emailed to all participants at the conclusion of the study. Because everyone will see your scores it is important for you to do well in this difficult throwing task. You must try very hard to do well on this task. I will be your leader for this task, and you are in my team. I will represent the qualities that define our team and what it means to be a member of our team. I know what makes this team special and distinct from other teams. I will be an exemplary and model member of our team. I will promote the interests of our team, standing up for our team's interests. I'll champion these ambitions we have that are key to our team as a whole. I will bring us together as a team. We will all feel part of the same group, knowing our core values, norms, and ideals. To achieve our goals, I will create structures that will allow us all to achieve success as a team. We will achieve, and we will show other teams that we matter. Please keep as still as you can for 2-minutes while you think about the upcoming ring toss task, and we collect some cardiovascular data.

Identity leadership threat instructions

Hello. My name is John. In a few moments you will complete a ring toss throwing task as part of a team. Whilst seated facing the targets in front of you, you must throw the ring onto the targets 10 times. The further away the target, the higher you will score. The maximum you can score is 100 points. However, it is unlikely that you will have done a task like this before, so you obviously can't be sure that you will perform well, so do try to avoid missing the poles. Also, complications are likely, as unavoidable nerves can majorly influence your throw. The task will be video recorded and will be done in-front of the researcher. Your scores on the task, along with everyone else's scores, will generate a league table from best performers to worst performers, and this will be emailed to all participants at the conclusion of the study. Because everyone will see your scores it is important for you to do well in this difficult throwing task. You must try very hard to do well on this task. I will be your leader for this task, and you are in my team. I will represent the qualities that define our team and what it means to be a member of our team. I know what makes this team special and distinct from other teams. I will be an exemplary and model member of our team. I will promote the interests of our team, standing up for our team's interests. I'll champion these ambitions we have that are key to our team as a whole. I will bring us together as a team. We will all feel

part of the same group, knowing our core values, norms, and ideals. To achieve our goals, I will create structures that will allow us all to achieve success as a team. We will achieve, and we will show other teams that we matter. Please keep as still as you can for 2-minutes while you think about the upcoming ring toss task, and we collect some cardiovascular data.

No identity leadership challenge instructions

Hello. My name is John. In a few moments you will complete a ring toss throwing task as part of a team. Whilst seated facing the targets in front of you, you must throw the ring onto the targets 10 times. The further away the target, the higher you will score. The maximum you can score is 100 points. You will have performed similar actions in the past. Because of this experience, you can feel confident that you will score highly. We would like you to try your upmost to score as highly as possible. The equipment is set up to allow you to complete the task without complications. The task will be video recorded and will be done in-front of the researcher. Your scores on the task, along with everyone else's scores, will generate a league table from best performers to worst performers, and this will be emailed to all participants at the conclusion of the study. Because everyone will see your scores it is important for you to do well in this difficult throwing task. You must try very hard to do well on this task. I will be your leader for this task, and you are in my team. I do not represent the qualities that define our team and what it means to be a member of our team. I do not know what makes this team special and distinct from other teams. I will not be an exemplary and model member of our team. I will not promote the interests of our team, nor will I stand up for our team's interests. I will not champion these ambitions we have that are key to our team as a whole. I will not bring us together as a team. We may not feel part of the same group, as I don't know your core values, norms, and ideals. I will not be able to create structures that will allow us all to achieve success. Please keep as still as you can for 2-minutes while you think about the upcoming ring toss task, and we collect some cardiovascular data.

No identity leadership threat instructions

Hello. My name is John. In a few moments you will complete a ring toss throwing task as part of a team. Whilst seated facing the targets in front of you, you must throw the ring onto the targets 10 times. The further away the target, the higher you will score. The maximum you can score is 100 points. However, it is unlikely that you will have done a task like this before, so you obviously can't be sure that you will perform well, so do try to avoid missing the poles. Also, complications are likely, as unavoidable nerves can majorly influence your throw. The task will be video recorded and will be done in-front of the researcher. Your scores on the task, along with everyone else's scores, will generate a league table from best performers to worst performers, and this will be emailed to all participants at the conclusion of the study. Because everyone will see your scores it is important for you to do well in this difficult throwing task. You must try very hard to do well on this task. I will be your leader for this task, and you are in my team. Even though I lead our team, I do not represent or know the qualities that define our team nor what it means to be a member of this team. I do not know what makes this team special and distinct from other teams. As such, I will not be able to be an exemplary and model member of our team. Because of this, I will not promote the

interests of the team, nor will I be able to stand up for the team's interests. I will not be able to champion the team's ambitions. I will not be able to bring us together as a team. We may not feel part of the same group, as I don't know your core values, norms, and ideals. I will not be able to create structures that will allow us all to achieve success. Please keep as still as you can for 2-minutes while you think about the upcoming ring toss task, and we collect some cardiovascular data.