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**The Effects of an Authentic Coaching Intervention on Athlete Outcomes: A Pilot
Randomised Controlled Trial**

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Abstract

Objectives

Authentic leadership has been found to be related to promising outcomes in sport. However, no intervention designed to increase coaches' authentic leadership exists. The aim of this study was to develop and evaluate such an intervention.

Design

The study was a pilot randomised controlled trial with a pre-post mixed design with Group (Intervention, Control) as between and Time (pre, post) as within-participants factors.

Method

A total of 18 coaches ($M_{age} = 37.89$; 83% male) and their athletes ($N = 153$; $M_{age} = 20.48$; 50.3% females) were randomly allocated, via block randomisation, into either an intervention (coaches $n = 9$, athletes $n = 90$) or a control group (coaches $n = 9$, athletes $n = 63$). The coaches in the intervention group received a 2-hour-long workshop and completed weekly coaching logs. Data were collected via questionnaires and were administered to both the coaches and their athletes prior to the intervention and two months after the intervention.

Results

A manipulation check revealed the intervention group reported higher authentic leadership, compared to the control group. A mixed multivariate analysis of variance indicated that athletes in the intervention group reported significantly higher enjoyment and prosocial behaviour from pre to post-test compared to the control group.

Conclusions

The findings suggest that an authentic coaching intervention can be effective in improving coaches' authentic behaviours and promoting positive athlete outcomes.

Keywords: coaches, enjoyment, athletes, prosocial behaviour

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1 In sport, coaches are seen as highly influential and are vital in eliciting positive athlete
2 outcomes (Nichol et al., 2019; Vella et al., 2013). It has been suggested that effective coaches
3 need to focus on the positive psychological growth of athletes and interpersonal relationships
4 (Côté & Gilbert, 2009; Vella et al., 2013). Developing interventions to promote effective
5 coaching behaviours is important in order to positively impact on athletes' developmental
6 outcomes (Nichol et al., 2019). This has become particularly important in the past few years,
7 in light of the recent decline in sports participation with age and moral sport scandals
8 (Turnnidge & Côté, 2017). Authentic leadership is a form of leadership that could facilitate
9 positive athlete outcomes and is the focus of the present research.

Authentic Leadership

11 Authentic leadership is a genuine style of leadership, where leaders display behaviours
12 that are in line with their inner values (Avolio et al., 2004). Authentic leaders are concerned
13 with their followers' development, involve their athletes in decision-making, act in an ethical
14 manner and build trusting relationships with followers (Avolio et al., 2004). Many definitions
15 of authentic leadership exist. In this study, we utilize Walumbwa et al.'s (2008) definition,
16 which defines authentic leadership as "a pattern of leader behaviour that draws upon and
17 promotes both positive psychological capacities and a positive ethical climate, to foster
18 greater self-awareness, internalized moral perspective, balanced processing of information,
19 and relational transparency on the part of leaders working with followers, fostering positive
20 self-development" (p. 94).

21 Authentic leadership consists of four components: self-awareness, relational
22 transparency, balanced processing, and internalised moral perspective. Self-awareness refers
23 to how one makes sense of the world and consequently their views of themselves

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(Walumbwa et al., 2008). Furthermore, self-awareness suggests authentic leaders are aware of their own strengths, weaknesses, inner values and moral values (Ilies et al., 2005; Walumbwa et al., 2008). Relational transparency refers to acting in accordance with one's true self, values and morals and being open with followers (Ilies et al., 2005). This includes telling athletes the hard truth, admitting mistakes and displaying emotions exactly in line with feelings (Walumbwa et al., 2008). Balanced processing pertains to leaders objectively processing all available information, including their followers' perspective before coming to a decision (Walumbwa et al., 2008). Authentic leaders are willing to consider different points of view, even if these challenge their own positions (Walumbwa et al., 2008). Finally, internalized moral perspective refers to having high moral standards, rather than them being guided by external pressures; authentic leaders also express where they stand on controversial issues and ask that their followers do the same (Walumbwa et al., 2008).

Authentic leaders may impact on important athlete outcomes and are highly relevant to sport in several ways. Firstly, authentic leadership incorporates a moral component, which suggests authentic leaders could establish moral team norms and thus may positively impact on followers' moral behaviours (Walumbwa et al., 2008). This is vital in sport as behaviours such as cheating and aggression are commonplace and are largely influenced by the norms coaches create (Kavussanu & Boardley, 2009). Furthermore, coach-athlete relationships are highly important in sport. Authentic leaders are concerned with their followers' development and create trusting relationships with them. This could have a beneficial impact on positive athlete outcomes which may influence sports participation such as commitment and enjoyment (Bandura & Kavussanu, 2018; Bandura et al., 2019) thereby addressing issues with sports participation, which has been found to decline with age (Slater & Tiggemann, 2011). Finally, authentic leaders influence their followers by leading by example and showing dedication to their development (Walumbwa et al., 2008).

Authentic leadership provides a multilevel leadership approach to coaching which is highly relevant to sport and focuses on the relationship leaders have with their followers, as well as incorporating four key components (i.e., self-awareness, relational transparency, balanced processing, and internalised moral perspective). These key components make it distinguishable from other theories of leadership (e.g., transformational and ethical leadership). According to models of authentic leadership, authentic leaders are expected to promote a range of follower outcomes, as will be discussed in the following sections (e.g., Avolio et al., 2004; Ilies et al., 2005; Gardner et al., 2005). By creating an intervention programme designed to teach coaches how to become authentic leaders it may have a positive impact on the athlete outcomes discussed in the following sections.

Consequences of Authentic Leadership

Models of authentic leadership propose that this leadership style could lead to a number of positive outcomes in followers (e.g., Avolio et al., 2004, Gardner et al., 2005; Ilies et al., 2005). A key outcome authentic leadership is believed to influence is trust, which has been defined as feeling that one can rely on their leader and believing that the leader has good intentions for the team (Dirks, 2000). Authentic leaders are expected to create high trust as a result of them being genuine and credible leaders, and through being open and demonstrating high moral standards (Gardner et al., 2005; Ilies et al., 2005). The positive relationship between authentic leadership and trust has been confirmed in sport research (e.g., Bandura & Kavussanu, 2018).

Authentic leadership may also influence coach-athlete relationships, which comprise of closeness, commitment, and complementarity (Jowett & Cockerill, 2003). Closeness refers to how coaches and athletes emotionally express their relationships and includes trust; commitment refers to athletes' cognitions about whether they share beliefs and values with their leader; complementarity refers to the interactions between the coach and athletes, and

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relates to the similarity of coaches' and athletes' interpersonal behaviours. Authentic leaders may create strong relationships with their athletes as they are open, show their true self, and develop trusting relationships with their followers.

Authentic leaders may also be capable of promoting higher cohesion (Avolio et al., 2004). Cohesion is defined as “a dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of instrumental objectives and/or the satisfaction of group members affective needs” (Carron et al., 1998, p. 213). Authentic leaders are expected to create more cohesive teams as a result of followers identifying with their leader, and consequently their team, through authentic leaders providing high levels of social support (Avolio et al., 2004). The relationship between authentic leadership and group cohesion has been supported by a study, which found authentic leadership was positively related to team cohesion in athletes (Bandura et al., 2019).

Team culture is another variable authentic leaders may positively impact upon (e.g., Gardner et al., 2005). Team culture is a concept similar to school culture which consists of four components (Higgins-D'Alessandro & Sath, 1998): normative expectations, leader/team relationships, follower relationships, and educational opportunities. Authentic leadership may positively influence team culture, because authentic leaders are transparent, create open relationships with their followers, and provide opportunities to the team, and this over time may become the culture of the team (Gardner et al., 2005). Studies have found a positive relationship between authentic leadership and similar variables to team culture, such as team climate, defined as supportive and trusting social environments, in organizational and nursing settings (e.g., Nelson et al., 2014; Shirey, 2006).

Authentic leadership may also be related to follower enjoyment and commitment (e.g., Gardner et al., 2005; Ilies et al., 2005). Enjoyment is “a positive affective response to the sport experience that reflects generalised feelings such as pleasure, liking and fun”, while

commitment is a “psychological construct representing the desire and resolve to continue sport participation” (Scanlan et al., 1993, p. 6). Authentic leaders should promote enjoyment and commitment through creating trusting relationships with followers, by spreading their own positive emotions, and by creating supportive team cultures (Gardner et al., 2005; Ilies et al., 2005). Indeed, one study found that authentic leadership was positively related to athletes’ commitment and enjoyment (Bandura & Kavussanu, 2018). Both enjoyment and commitment are vital in sport as they influence [athletes’ continued involvement in sport participation beyond adolescence](#) (Scanlan et al., 1993; Slater & Tiggemann, 2011).

Finally, authentic leadership incorporates a moral dimension, reflected in authentic leaders acting in line with their moral values, which is expected to have a positive influence on followers’ prosocial behaviours (Walumbwa et al., 2008). Prosocial behaviours are “voluntary behaviours intended to help or benefit another individual” (Eisenberg & Fabes, 1998). Authentic leaders could promote followers’ moral behaviours, by influencing the team culture to become more ethical and instilling a norm to act ethically (Gardner et al., 2005). Hannah et al. (2011) found that authentic leadership was positively related to soldiers’ ethical and prosocial behaviours, common in a military training center, such as considering soldiers’ impact on others and putting the good of the group ahead of their own self-interest. In one experiment, participants assigned to a high authentic leadership condition were less likely to make unethical decisions in the face of temptation, compared to participants assigned to a low or neutral authentic leadership condition (Cianci et al., 2014).

Current Investigation

In summary, authentic leadership has been related to several positive outcomes such as trust, cohesion, enjoyment, and commitment (Bandura et al., 2019; Bandura & Kavussanu, 2018; Shirey, 2006). It could also be associated with coach-athlete relationships, team culture, and prosocial behaviours. However, to date, no study has investigated the effects of

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authentic leadership on these variables. There is a need to develop an authentic coaching intervention and examine its effectiveness on these athlete outcomes. The aim of this study was to develop such an intervention and evaluate its effectiveness on a range of outcomes (i.e., trust, coach-athlete relationships, cohesion, culture, enjoyment, commitment, and prosocial behaviour). To this end, once we developed the intervention, we recruited coaches who were assigned to an intervention or a control group. We hypothesised that compared to the control group, athletes in the intervention group would report higher scores on the outcomes we examined (trust, cohesion, culture, coach-athlete relationships, enjoyment, commitment, and prosocial behaviour) from pre to post intervention.

The present study adds to the literature on two accounts. First, it is the first study to develop an authentic leadership intervention. Second, it is the first study to examine the effects of authentic leadership on a range of athlete outcomes. The study is important because by showing that we can train coaches to become authentic we can help them create more positive and ethical coaching environments, which may help to address current issues in sport such as the decline in sports participation with age (Turnnidge & Côté, 2017).

Method

Design

The study consisted of two phases. In the first phase, we developed the intervention. During the second phase we tested the efficacy of the intervention using a small-scale pilot randomized controlled trial (RCT) with a pre-post mixed design, over one sports season.

Phase 1: Development of the Intervention

Prior to starting the study, ethical approval was obtained from the University ethical research committee. The development of the intervention was based on the authentic leadership literature and its content reflected concepts solely relevant to authentic leadership (e.g., Avolio et al., 2004; Walumbwa et al., 2008; Gardner et al., 2005). Full details of the

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intervention can be seen in Table 1 and in the Template for Intervention Description and Replication checklist (TIDieR; Hoffman et al., 2014), presented in S1 of the supplementary material. The intervention consisted of an initial group workshop, training manual, and a second workshop. The initial group workshop consisted of: presentations including written information, videos and quotes from well-known coaches; scenario tasks; role-play activities and group-based exercises; and SMART (Specific, Measurable, Achievable, Realistic, Time-Constraint) goals for each of the components of authentic leadership (Vella et al., 2013). The training manual contained the information presented in the workshop, and a coaching log in which coaches were asked to write their SMART goals. The second workshop, which took place four weeks after the first workshop used the GROW model (i.e., Goals: relating to what they want to achieve; Reality: where they are now in terms of achieving goal; Options: describing what they could do to achieve their goal; What: what are they going to do now to achieve their goals), to assess the coaches' progress towards their SMART goals.

For the coaching log, the coaches were provided with a list of behaviours relating to each component of authentic leadership and were asked to focus on one component every week, for the first four weeks, recording the number of times they engaged in the behaviours, and provide written examples of how they did so. The coaches were also asked to reflect on each session by asking them questions such as “how did you find incorporating authentic leadership into your coaching sessions this week?” and “what could you do differently regarding authentic leadership?”. For example, for relational transparency, one coach recorded that they had told the hard truth 4 times, with an example being “I allowed players to know my true thoughts at the end of the session which helped me to gain more feedback”. The logs were sent to the researchers each week. After the first four weeks, coaches were asked to choose one behaviour per component to implement each week and again record how often they engaged in these behaviours and provide examples of how they did so.

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The second workshop was 1.5 hours long and allowed for more one-to-one conversations with the coaches. Its aims were to give a refresher of the material, to address any issues they may have had in the first month, and to assess their progress towards the SMART goals they had set during the initial workshop. The GROW format (Vella et al., 2013) influenced the structure of the conversation with each coach. We asked them to state the four goals they set in the first workshop and where they were in terms of achieving their goals. Then we asked them to think of any strategies they could employ to achieve their goals, helped them set some plans to achieve their goals, and helped them set new goals. The GROW format was adapted to be relevant to the authentic leadership SMART goals they had set during the initial workshop and ensured the coaches were engaging with what they had learnt during the intervention by demonstrating authentic leadership in their coaching.

The different components of the intervention were selected based on Nelson et al. (2013) suggestions for effective coach education which states interventions should: (a) use thought provoking pedagogical approaches which actively involve the coaches and result in an improvement in knowledge and ability to demonstrate the behaviours; (b) use a range of learning resources, and provide new, high-quality supporting material; (c) be coach-centred and relevant to their own personal coaching practice; (d) link theory to practice, provide practical examples, and utilize group learning in which coaches can share their knowledge; (e) use confident presenters who possess an in-depth understanding of the cutting-edge ideas.

The authentic coaching intervention covered all of these components by using novel ideas from the authentic leadership literature and by incorporating many different teaching strategies described above. The authentic coaching intervention employed techniques from several previous successful intervention studies in transformational leadership (e.g., Barling et al., 1996; Vella et al., 2013) which related to Nelson et al. (2013) recommendations and the authentic leadership literature. These techniques were adapted to only include information

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relevant to authentic leadership. For example, setting SMART goals allowed the intervention to be specific to the coaches and authentic leadership, by setting personalised authentic leadership goals. We also used practical examples in the form of well-known coaches so the coaches could witness the successful implementation of authentic leadership (Nelson et al., 2013). Furthermore, we included interactive group activities which allowed coaches to share their experience and provided practical examples of how to demonstrate authentic behaviours. The supporting material provided coaches with a better understanding of authentic leadership. Lastly, the intervention was delivered by the lead author, who had high levels of expertise on authentic leadership, whilst research assistants helped encourage the coaches' involvement during group exercises as a result of prior training in how to engage the coaches in the session, e.g., by being given examples of prompts and questions to ask.

The intervention also covered the components of a successful intervention as proposed by Hoffman et al. (2014) such as using a theory to guide the intervention, which in this case was Walumbwa et al.'s (2008) definition of authentic leadership and authentic leadership theory. To ensure fidelity of the intervention we employed strategies proposed by Gearing et al. (2011) such as ensuring: the content is based on theory, that the study had well-defined objectives, procedures and outcomes, the use of pre and post-test self-report measures to examine changes that occurred as a result of the intervention, and by providing the conceptual relevance of authentic leadership. To ensure fidelity of delivery we used strategies such as including a checklist of the intervention material, a second workshop session to ensure the coaches understood the first workshop, taking attendance, ensuring the treatment differed for the intervention and control group, ensuring a good participant-researcher ratio (6-4), and presenting the information in a simple way, (Gearing et al., 2011).

Once the intervention material was developed, we conducted a focus group with 5 coaches to refine the material. This included a presentation of the intervention material; we

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asked coaches to give their feedback on the material using closed and open-ended questions for example, “on a scale of 1 to 7, how engaging did you find the presentation?” and “what would you change to make this section better?” Responses revealed that the participants found the presentation highly interesting, clear, enjoyable and engaging and the content could be improved by providing specific examples from the media and including more female coach examples. In light of this feedback, the intervention material was revised to implement these changes prior to administering the main trial described below.

Phase 2: Evaluation of the Authentic Coaching Intervention

The second phase involved delivering the authentic coaching intervention to a group of coaches and evaluating its effectiveness. As this study was a pilot study and therefore not a fully powered study, and only a small sample of coaches were used, a priori power analysis was not needed (Hertzog, 2008). The coaches were randomly allocated to either the intervention group, who received the intervention workshop or the control group, who did not¹. The CONSORT (2010) flow diagram for participant flow is presented in Figure 1.

Participants. Participants were 18 coaches and their 153 athletes¹. The eligibility criteria for the coach and athlete participants were that they are healthy, over 16, and coach a team/participate in sport respectively, at the time of data collection. As can be seen in Table 2, the majority of the coaches were male (93.3%) and coached within British Universities and Colleges Sport (BUCS) leagues ($n = 10$), with the remaining coaching in external leagues. Both the university and external leagues competed at a similar amateur level, with a mixture of team and individual sports who practiced within a team.

Measures

For the pre-test questionnaire, participants were asked to think about their experiences/behaviours so far this season; and for the post-intervention questionnaire over the past 2 months. Although data were collected from both coaches and athletes, the main

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analysis was conducted on only the athlete data, due to the small number of coaches and because followers' perceptions of their leaders' behaviours are more reliable (Avolio et al., 2004). We have included the coach data in S2 of the supplementary material. The coach data and athletes' perception of their coaches' authentic leadership were used to examine whether the intervention was successful in increasing coaches' authentic leadership behaviours.

Athlete Measures

Authentic Leadership. Athletes rated their perceptions of their coach's level of authentic leadership using the Authentic Leadership Questionnaire (ALQ; Walumbwa et al., 2008). The wording of the questionnaire was changed to state "my coach". Athletes were asked to think about their experiences with their coach and rate their perceptions of their coaches use of authentic leadership on a 5-point scale with 1 corresponding to "*not at all*" and 5 corresponding to "*frequently if not always*". This scale has been found to have good reliability ($\alpha = .85$; Bandura et al., 2019). [The Cronbach alphas for each of the scales, as found in the present study, are presented in Table 3.](#)

Trust. Athletes rated their levels of trust towards their coach using the Trust Questionnaire (Dirks, 2000). This scale consists of nine items, and an example item is "I trust and respect my coach." Participants are asked to think about their experiences with their coach this season and circle an appropriate answer using a 7-point Likert scale, with 1 representing "*strongly disagree*" and 7 "*strongly agree*". This scale has been found to be reliable, as shown by a Cronbach alpha of .96 (Dirks, 2000).

Coach-Athlete Relationship. Athletes rated the nature of their relationship with their coach using the CART-Q (Jowett & Ntoumanis, 2004). The wording of the questionnaire was changed to reflect the athletes' perception of their relationship with their coach. An example item of the closeness subscale is "I feel close to my coach", an example of the complementarity subscale is "when I am coached by my coach, I feel at ease" and an

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example item of the commitment subscale is “I feel committed to my coach”. The athletes were asked to think about their experience with their coach and rate their agreement to each statement using a 7-point Likert scale with 1 corresponding to “*strongly disagree*” and 7 “*strongly agree*”. This scale has been found to be reliable as demonstrated by Cronbach alphas of .82 - .88 (Jowett & Ntoumanis, 2004).

Team Cohesion. We measured team cohesion using the Youth Sport Environment Questionnaire (Eys et al., 2009), which measures task and social cohesion, with nine items for each subscale. We used this questionnaire (rather than the adult version) as we had some participants under the age of 18; this questionnaire is more suitable for athletes below the age of 18, as youths may not be able to distinguish between group integration and individual attraction to the group, thus they could misinterpret the questionnaire (Eys et al., 2009). An example item for social cohesion is “I spend time with my teammates” and for task cohesion “my approach to playing is the same as my teammates”. Participants were told to think about their experience with their team this season and circle the appropriate number using a 9-point Likert scale with 1 corresponding to “*strongly disagree*” and 9 corresponding to “*strongly agree*”. For this study we computed an average score for the two subscales and used this in all analysis, as the correlation amongst the two subscales was high (.69). This scale has been found to be reliable ($\alpha = .84$; Bandura et al., 2019).

Team Culture. Athletes’ perceptions of their team culture were measured using an adapted version of the School Culture Scale to sport (SCS; Higgins-D’Alessandro & Sath, 1998). This has been adapted to sports studies to measure positive sociomoral team cultures by making the items sports-specific and removing items which are not relevant to the sport context (e.g., Rutten et al., 2007). The wording of the questionnaire was also changed so that “teacher” became “coach” and “students” became “athletes.” We included three subscales with 14 items: teacher/school relationships (5 items, e.g., “athletes generally treat each other

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with respect and fairness”), athlete relationships (3 items, e.g., “my coach generally treats their athletes with respect and fairness”), and educational opportunities (6 items, e.g., “athletes learn how to listen to other people’s ideas better”). Participants were asked to rate how true the statements were for their team this season using a 5-point scale with 1 corresponding to “*false*” and 5 “*true*”. The average of the three subscales was used in the analyses, as the subscales were found to be highly correlated (.65, .76, .71). This scale has been found to be reliable ($\alpha = .85$; Higgins-D’Alessandro, & Sath, 1998).

Enjoyment and Commitment. The athletes rated their levels of enjoyment and commitment using two subscales with 4 items respectively, from the Sport commitment model (Scanlan et al., 1993). An example item from the enjoyment scale includes “are you happy playing for this team” and from the commitment subscale “how hard what it be for you to quit playing for this team”. Participants were asked to think about their experiences in their team and circle the appropriate number using a 5-point Likert scale with one corresponding to “*not at all*” or “*not at all dedicated*” and five “*very much*” or “*very dedicated*” for the enjoyment and commitment scales, respectively. The scale has shown to have good reliability of $\alpha = .95$ for enjoyment and $\alpha = .88$ for commitment (Bandura & Kavussanu, 2018).

Prosocial Teammate Behaviours. Athletes rated their levels of prosocial behaviours using the prosocial behaviour towards teammate subscale of the Prosocial and Antisocial Behaviour in Sport Scale (PABSS; Kavussanu & Boardley, 2009). This is because we expected that authentic leadership would influence athletes’ prosocial behaviour towards their teammates. This scale consists of five items (e.g., “Congratulated a teammate for good play”). Athletes were asked how often they engaged in the behaviours this season using a five-point Likert scale with 1 corresponding to “*never*” and 5 “*very often*”. This scale was found to be reliable, as shown by Cronbach alphas of .74 (Kavussanu & Boardley, 2009).

Procedure

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A total of 62 coaches were contacted via email or phone, using purposeful sampling techniques and were invited to take part in the study and to allow their athletes to take part in the study. The participants were told the purpose of the study, that data would be confidential and for research purposes only, that they could withdraw their data at any point, and that participation was voluntary. The recruitment took place over a period of two months. Once the coaches agreed to take part in the study a date and time was arranged for Time 1 data collection. The order of the measures in the questionnaire was counterbalanced to avoid order effects. The pre-test questionnaires were given to both the coach and athletes, at the start or end of a practice session, towards the middle of the season, and took 10-15 minutes to complete. The same questionnaire was then given to all participants 2 months later, after the intervention, in order to allow for enough time for the coaches in the intervention group to implement the behaviours they had learnt during the intervention.

As this was only a pilot study this time frame was kept relatively short to avoid dropout, allow for enough time for coaches to complete their coaching logs, and assess the intervention's initial effectiveness, as suggested by previous coach interventions which were between 8 weeks and 12 months (e.g., McEwan & Beauchamp, 2020; Vella et al., 2013). In addition, the purpose of the short time frame was to assess whether this would be sufficient time for coaches to implement the behaviours learnt during the intervention, in order to guide the time frame of a future RCT.

The coaches, and their respective athletes, were then randomly allocated to either the intervention or the control group, by the lead experimenter using block randomisation techniques, as the sample size was small (Kim & Shin, 2014). A strength of RCT is that it eliminates selection bias. Specifically, the coaches were allocated a number and their names removed to ensure anonymity. We then used a block randomization online calculator which randomly split the coaches into four blocks of two groups (group A relating to the

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intervention group, and B being the control) and picked the fourth block of random numbers. The letters A or B were added next to the 18 numbers, which were then checked against the original list of coaches. The intervention group then received the three-hour face-to-face group workshop; there was no intervention for the control group. The intervention was only delivered once. The workshop took place in a seminar room on campus. The coaches in the intervention group were given financial compensation for their time and for travel to the intervention location. They were asked to complete weekly coaching logs to assess their progress. The overall compliance with the weekly coaching log reporting through Week one to four was high (100%), and lower for weeks 5 (66.7%), 6 (66.7%), 7 (66.7%), and 8 (50%). The intervention was evaluated by the experimenters using the questionnaires and the coaching logs. The first coaching workshop was followed up by regular contact and a second workshop at the midway point with all the intervention group coaches, four weeks later, which was half-way through the intervention time. All the steps of the study are presented in S3 of the supplementary material.

Data Analysis

Data analyses were conducted using the Statistical Program for Social Sciences (SPSS v. 26). Preliminary data analysis was firstly conducted to examine whether there was any missing data and in order to calculate the Cronbach alphas. Descriptive statistics were then calculated. For the main analysis we conducted a mixed MANOVA, followed by a post hoc analysis of pairwise comparisons based on estimated marginal means to examine whether athletes of coaches in the intervention group would report higher scores on the outcomes from pre to post-intervention compared to the control group. We report the partial eta-squared (η_p^2) as the effect sizes, with .02, .13 and .25 considered small, medium, and large effect sizes respectively (Cohen, 1992). For the variables which demonstrated a significant interaction effect, an Analysis of Covariance (ANCOVA) was conducted, to examine

whether group differences on each variable in the Time 2 scores were significant, when controlling for Time 1 scores.

Results

Descriptive Statistics and Alpha Coefficients

Preliminary data analysis revealed the data to be normally distributed according to the Shapiro-Wilk test and visual inspection of the histograms, Q-Q plots, and boxplots. There were no missing data from the coach data set. For the athlete data set, missing data were 0.7% at time 1 and 13.1% at Time 2. A MCAR (Missing Completely at Random) test showed the data to be missing completely at random (Chi-square = 505.44, $df = 585$, $p = .999$), as the significance levels indicate we were not able to reject the null hypothesis that the data would be missing at random. Therefore, multiple imputation was used to replace the missing values, as this is considered a valid method of handling missing data in randomised controlled trials (Jakobsen et al., 2017). The multiple imputation procedure generated five data sets; their sum was used to replace the missing values and was used throughout the rest of the analysis. Therefore, for the following analysis the data from the original 153 athletes were used¹.

Table 3 displays the Cronbach alphas and descriptive statistics for the athlete variables. In general, the Cronbach alphas for the athlete measures were considered good to excellent, whilst the scores for the prosocial teammate behaviour subscale of the PABSS were considered acceptable ($> .9$ = Excellent; $> .8$ = Good; $> .7$; George & Mallery, 2003). Athletes reported moderate levels of perceived coach authentic leadership, team cohesion, and teammate prosocial behaviours. Athletes also reported high levels of commitment, trust, team culture, enjoyment and coach-athlete relationships.

Authentic Leadership

A mixed MANOVA, conducted on the athlete data revealed a significant Group effect and Group x Time interaction for authentic leadership, as can be seen in Table 4. The follow

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up ANCOVA controlling for Time 1 scores, presented in Table 5, revealed that athletes in the intervention group reported higher perceptions of authentic leadership compared to the control group, thus confirming that the intervention was successful in changing coaches' authentic leadership.

Main Analysis

The main purpose of our study was to examine whether the coaching intervention was effective in increasing the outcomes; to this end, we examined scores in the intervention group from pre to post intervention, compared to the control group. Table 4 shows the results of a mixed MANOVA. There was a significant Time effect for team culture and coach athlete relationship and significant Group x Time interaction effects for enjoyment and prosocial behaviour. The latter effects are illustrated in Figure 2. There were no effects for cohesion, commitment, and trust.

For the variables which showed a significant interaction effect we also compared the Time by the intervention Group, using pairwise comparisons based on estimated marginal means to examine whether the mean of the variables was different for the two groups at Times 1 and 2. As can be seen in Table 3, the intervention group showed that authentic leadership, enjoyment and prosocial behaviours were not different to the control group at the first time point, but were respectively different at follow-up. Pairwise comparisons showed that, at Time 2, athletes in the intervention group reported significantly higher authentic leadership, enjoyment, and prosocial behaviour than athletes in the control group.

The Mixed MANOVAs which showed a significant Group x Time interaction, were also followed up by an ANCOVA. As can be seen in Table 5, in Time 2, athletes reported significantly higher authentic leadership, enjoyment and prosocial behaviour, when controlling for Time 1 scores of each variable.

Discussion

To date, a limited amount of research has been carried out on authentic leadership in sport which has shown that authentic leadership is related to several positive athlete outcomes such as trust, cohesion, enjoyment, and commitment (e.g., Bandura et al., 2019; Bandura & Kavussanu, 2018). However, these studies have been cross-sectional and cannot establish causal relationships. Authentic leadership is a highly relevant model of leadership in sport and may be positively related to additional outcomes which have not yet been investigated (e.g., Avolio et al., 2004; Gardner et al., 2005). Therefore, this study aimed to develop an intervention designed to increase coaches' use of authentic behaviours and evaluate the impact of this on athlete outcomes.

Effects of Intervention on Outcomes

In line with our hypothesis, athletes of coaches in the intervention group rated their coaches' authentic leadership to be higher from pre to post intervention, compared to the control group, suggesting that the intervention was successful in changing the coaches behaviours to become more authentic. Similarly, also in line with our hypothesis, athletes of coaches who received the intervention reported greater enjoyment compared to the control group, from pre to post intervention. The findings of the impact of the intervention on athletes' enjoyment extends the results of a cross-sectional study in sport (Bandura & Kavussanu, 2018). Our study is the first to show that by implementing authentic leadership behaviours, coaches can actually increase enjoyment in their athletes. The increase in enjoyment, in the intervention group, in comparison to the control group, is a significant finding as this variable is highly influenced by factors in the social environment, such as the type of leadership coaches display, and plays an important role in continued sports participation (Scannlan et al., 1993). The results enhance our understanding of the relationship between authentic leadership and athletes' enjoyment, by suggesting that when coaches display authentic behaviours, such as those highlighted in our coaching programme,

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they are able to produce greater enjoyment amongst their athletes. The mechanism through which this occurs is not entirely clear, however, previous research suggests, this could be due to authentic coaches spreading their own positive emotions to their followers (Gardner et al., 2005; Ilies et al., 2005).

Our results also supported our hypothesis that athletes in the authentic leadership condition would report more frequent prosocial behaviours after the intervention, compared to the control group. This finding supports and extends previous research (e.g., Hannah et al., 2011), which found that authentic leadership was positively related to soldiers' prosocial behaviours. The findings suggest that an authentic coaching intervention is effective in increasing prosocial behaviours, by increasing coaches use of authentic leadership behaviours such as showing their true moral self to followers and asking their followers to do the same. Therefore, coaches should be encouraged to show authentic behaviours in their coaching practice in order to increase athletes' prosocial behaviour toward their teammates. In turn, this could lead to other desirable outcomes such as group cohesion, and performance.

Whilst we found that the intervention groups scores for trust, cohesion, team culture, commitment and coach-athlete relationships either remained the same or increased over time, compared to the control group; contrary to our hypotheses, these variables were not found to be significantly different from the control group from pre to post intervention. These null findings could be due to our study not including a long enough time between data collection points. Variables such as trust and coach-athlete relationships develop over time, as followers identify and begin to trust their leader (Avolio et al., 2004). Thus, trust and coach-athlete relationships may not have been influenced sufficiently by the small-time frame used in this study. Similarly, team culture and cohesion develop over time as they require the team's values to change; and this may not be adequately captured with time points relatively close

together. However, the results of this study still provide important initial evidence of the effectiveness of an authentic leadership coaching intervention (Cruickshank & Collins, 2013).

Overall, the results of the study demonstrate that our authentic coaching intervention was effective in increasing athletes' perceptions of their coaches use of authentic leadership and reported enjoyment and prosocial behaviours. These findings suggest that authentic leadership is a potentially viable addition to coach education programmes. This research is important because there is a substantial need for theoretically driven and coherent coach education models (Vella et al., 2013). Authentic leadership can provide a theoretically sound approach to sport leadership as it could lead to positive athlete outcomes. Furthermore, the results suggest authentic leadership behaviours should be encouraged amongst coaches.

Practical Implications

The results of this study demonstrated that it is feasible to implement an authentic coaching programme and that this promotes beneficial outcomes to sports participation and more moral sports behaviours. Therefore, coaches should be encouraged to change their coaching behaviour to display more authentic behaviours, such as having a greater understanding of themselves, being open with their followers, including their athletes in decision making, and displaying moral behaviours in-line with their inner values, in order to produce positive athlete outcomes. The results also suggest that authentic leadership models should be incorporated in future coach education models.

Limitations and Future Research Directions

Despite the interesting findings, our study was not without limitations. Firstly, only a small sample of coaches were included as this was the first study that has developed and examined the feasibility of an authentic leadership intervention for coaches. This may have been responsible for the null findings in several of our outcomes. Future research needs to include a larger sample and a wider range of coaches, from different sports or age ranges, to

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1 increase the generalisability of the results. Secondly, a large number of coaches declined to
2 participate in the study. This may have been due to conflict with coaches' commitments,
3 inconvenience of location of workshop, and lack of effective recruitment strategies. Future
4 research should consider promoting the benefit of the intervention more to coaches and using
5 more effective recruitment strategies.

6 Finally, the data collected from the coaches and athletes in relation to authentic
7 leadership provided some preliminary evidence of fidelity, in terms of whether the
8 intervention worked in changing coaches' authentic behaviours. However, future research
9 should complete a full process evaluation to examine why the intervention worked. This will
10 help to highlight the essential elements of the intervention and help to develop a logic model
11 and consequently develop a theory of behaviour change. This could include coaches
12 completing more in-depth coaching logs, post workshop feedback forms to provide
13 qualitative and objective measures of the intervention success, and methods to assess fidelity
14 of the delivery. The intervention should then be evaluated using a full-scale randomized
15 control trial over a longer period of time in order to increase confidence in the results and to
16 examine the casual mechanisms between the proposed relationships.

17 **Conclusion**

18 Our findings extend the current literature on authentic leadership in sport by
19 demonstrating that it is feasible to deliver an authentic leadership coaching intervention in
20 order to increase coaches use of authentic behaviours. Importantly, such an intervention can
21 lead to greater enjoyment and more frequent prosocial behaviour toward one's teammates.
22 Our findings suggest that coaches should be encouraged to display more authentic
23 behaviours. Finally, authentic leadership may provide a good theoretical foundation for future
24 coach education programmes.

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Endnote

¹Whilst the coaches were randomly allocated to the different conditions using block randomisation, 3 of the coaches were unable to attend the intervention due to other commitments and were removed from the analysis, along with their athletes.

Acknowledgement

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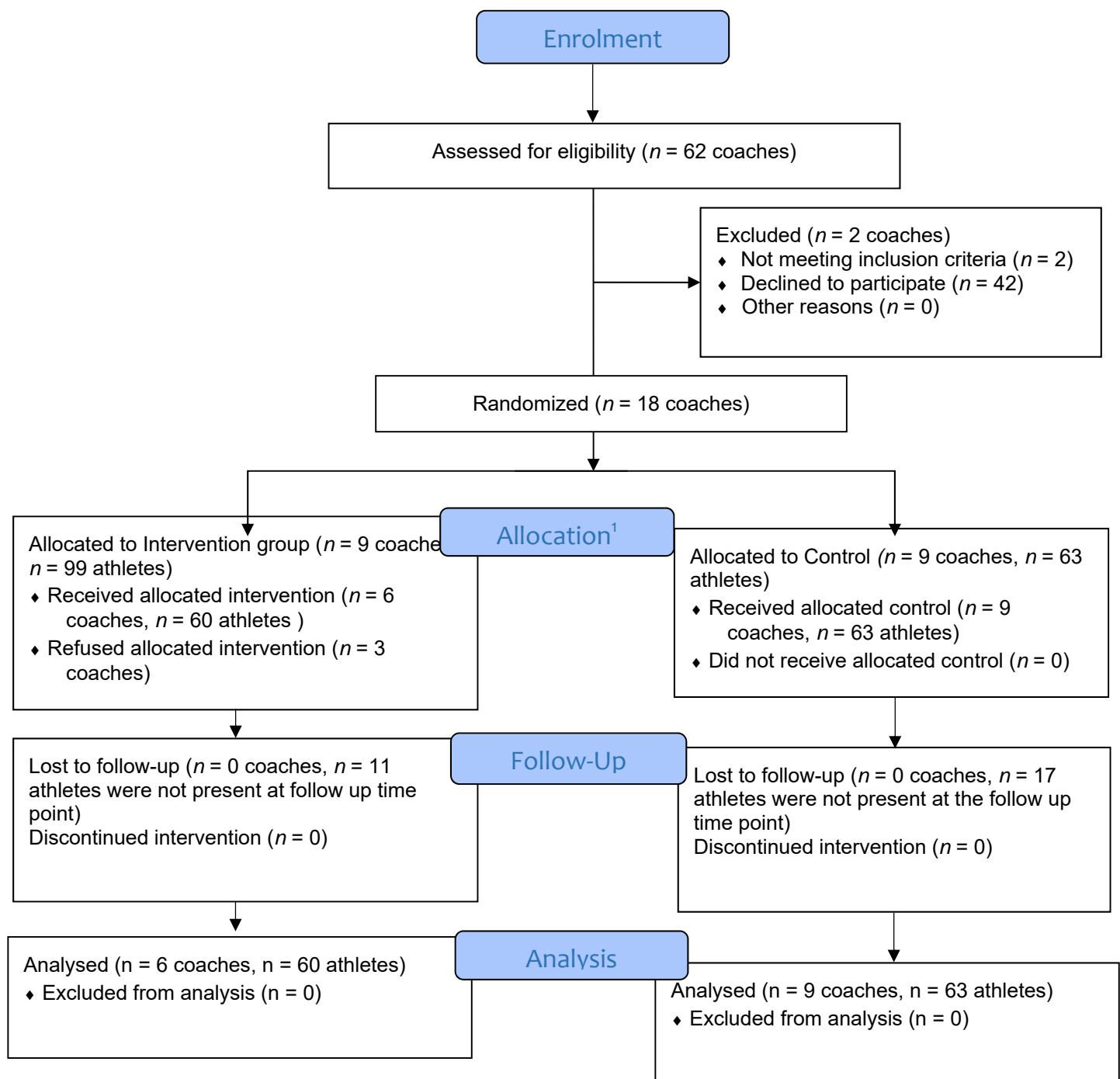
Table 1

Authentic Coaching Intervention Components and Content

Component	Content
Workshop	<ul style="list-style-type: none">• Discuss the importance of good coaching and present information on how it can lead to positive athlete outcomes.• Explain what authentic leadership is, its four components, its link with athlete outcomes, and its importance.• Provide examples of why authentic leadership is important and how behaviours of famous effective coaches illustrate each component.• Give practical examples of how to show each component in coaching.• Discuss with the group each component and ways coaches can solve common problems in their coaching in an ‘authentic’ way.• Come up with SMART goals based on what was presented.
Training Manual	<ul style="list-style-type: none">• Provide with main points of workshop content, additional space to contribute to group tasks and activities.
Coaching Log	<ul style="list-style-type: none">• Space for SMART goals set during session.• Provide information on how to show the behaviours relating to each component and space to tally how often engaged in authentic behaviours relating to different components and examples.
Second Workshop	<ul style="list-style-type: none">• Main points of workshop reiterated.• Provide additional mentoring towards SMART goals using GROW format.

Figure 1

CONSORT 2010 Flow Diagram



Note. This figure illustrates the CONSORT flow diagram of participant flow.

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Table 2

Participant Characteristics ($N_{Coaches} = 15$; $N_{Athletes} = 123$)

	Group
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		Coaches <i>M (SD)</i>	
		Intervention (<i>N</i> = 6)	Control (<i>N</i> = 9)
Variable			
Sex	Male	6 (100%)	8 (88.9%)
	Female	0 (0.0%)	1 (11.1%)
Sport	Football	3 (50.0%)	3 (33.3%)
	Athletics	2 (33.3%)	5 (55.6%)
	Mixed Martial Arts	1 (16.7%)	0 (0%)
	Korfball	0 (0%)	1 (11.1%)
Age		32.66 (18.90)	46.56 (19.93)
Years of coaching		10.83 (14.63)	9.67 (11.95)
Years of coaching team		8.33 (15.55)	4.56 (4.22)
		Athletes <i>M (SD)</i>	
		Intervention (<i>N</i> = 60)	Control (<i>N</i> = 63)
Sex	Male	49 (81.7%%)	23 (36.51%)
	Female	11 (18.3%)	40 (33.49%)
Sport type	Football	34 (56.7%)	30 (47.622%)
	Athletics	17 (28.3%)	21(33.33%)
	MMA	9 (15%)	0 (0%)
	Korf ball	0 (0%)	12 (19.05%)
Age		21.77 (.88)	20.25 (.53)
Years training with team		10.70 (.71)	9.58 (.811)
Years training with coach		1.42 (.16)	2.11 (.18)

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Table 3

Cronbach Alphas and Descriptive Statistics for Athlete Variables

Variable	A	Group			
		Intervention		Control	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Authentic Leadership					
Time 1	.92	3.98	.69	3.95	.60
Time 2	.92	4.20	.51	33.87	.77
Trust					
Time 1	.93	6.34	.66	6.14	.93
Time 2	.90	6.27	.61	6.12	.51
Team Culture					
Time 1	.91	4.10	.52	4.05	.54
Time 2	.93	4.35	.50	4.27	.58
Team Cohesion					
Time 1	.90	7.12	1.20	7.36	.95
Time 2	.86	7.23	.87	7.14	.89
Coach-Athlete Relationship					
Time 1	.96	5.95	1.06	5.98	.91
Time 2	.94	6.22	.63	6.10	.81
Enjoyment					
Time 1	.96	4.58	.66	4.69	.54
Time 2	.93	4.62	.47	4.46	.55
Commitment					
Time 1	.85	4.28	.70	4.46	.53
Time 2	.86	4.44	.49	4.43	.58
Prosocial Behaviour					
Time 1	.79	3.87	.63	3.98	.58
Time 2	.77	4.00	.53	3.88	.50

Table 4

Mixed MANOVA Results for Athlete Variables (N = 123)

Variable	Effects (<i>F</i> (1, 121), <i>ES</i>)								
	Within-Subjects			Between-Subjects			Interaction		
	Time			Group			Group x Time		
	<i>F</i>	<i>ES</i>	<i>p</i>	<i>F</i>	<i>ES</i>	<i>p</i>	<i>F</i>	<i>ES</i>	<i>p</i>
Authentic Leadership	1.24	.01	.28	4.45	.04	.04	5.37	.04	.02
Trust	.52	.00	.47	2.13	.02	.15	.23	.00	.64
Team Culture	17.28	.13	.00	.99	.01	.32	.33	.00	.56
Cohesion	.46	.03	.50	.23	.00	.64	3.74	.03	.06
Coach-Athlete Relationship	6.60	.05	.01	.14	.00	.71	.93	.01	.34
Enjoyment	2.41	.02	.12	.11	.00	.74	4.95	.04	.03
Commitment	1.33	.01	.25	1.00	.01	.32	2.62	.02	.10
Prosocial Behaviour	.14	.00	.71	.01	.00	.92	4.38	.04	.03

Note. *ES* = effect sizes are partial eta squared (η_p^2): .02, .13 and .25 are considered small, medium and large effects, respectively (Cohen, 1992).

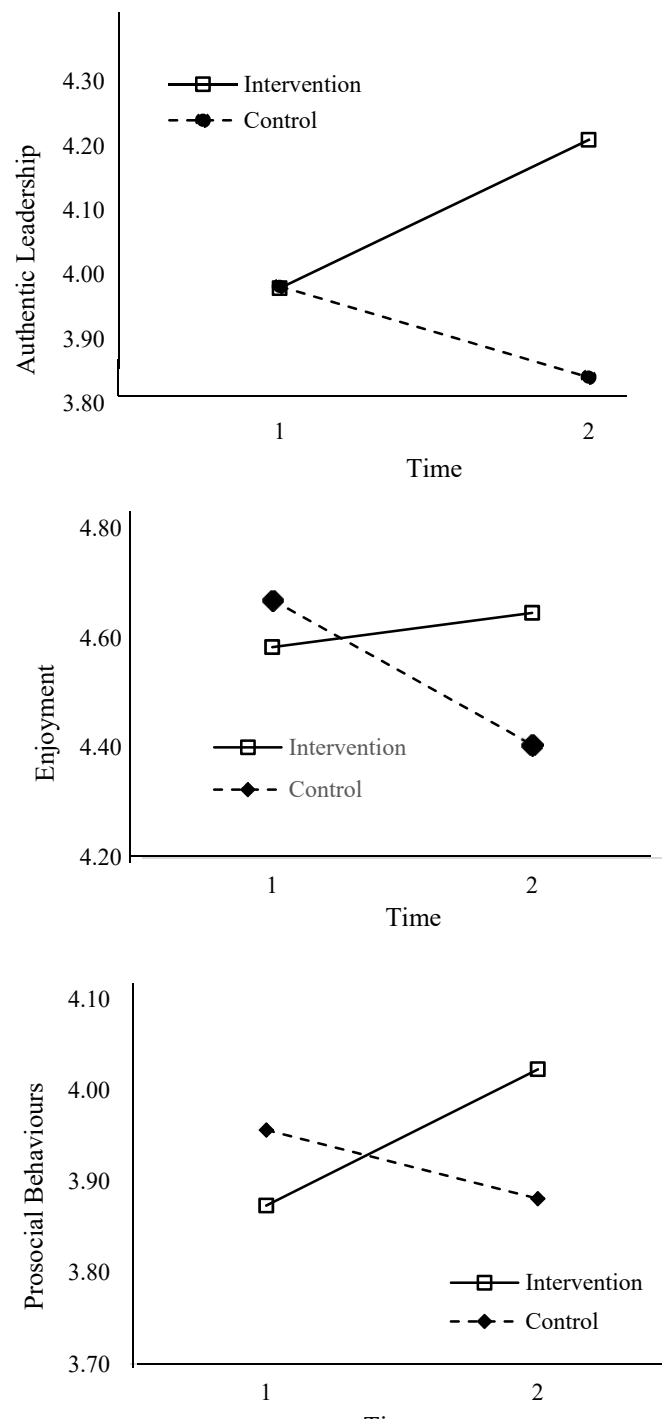
Table 5*ANCOVA Results for Time 2 Scores Controlling for Time 1 scores*

Variable	Group				$F(1, 122)$	η^2
	Intervention		Control			
	M	SD	M	SD		
Authentic Leadership	4.20	.07	3.87	.07	10.95**	.08
Enjoyment	4.63	.55	4.46	.54	4.31*	.04
Prosocial Behaviour	4.01	.53	3.87	.48	43.63*	.05

Note. ** $p < .01$; * $p < .05$

Figure 2

Authentic leadership, enjoyment, and prosocial behaviour as a function of group and time



Note. This figure shows athletes' perceptions of their coaches' authentic leadership, enjoyment and prosocial behaviour over time as a function of intervention group.

The range for the authentic leadership, enjoyment and prosocial behaviour variables is 1-5.

Supplementary material

S1 The TIDieR checklist



The TIDieR (Template for Intervention Description and Replication) Checklist*:

Information to include when describing an intervention and the location of the information

Item number	Item	Where located ** Primary paper (page or appendix number)
	BRIEF NAME	
1.	Provide the name or a phrase that describes the intervention.	_____1_____
	WHY	
2.	Describe any rationale, theory, or goal of the elements essential to the intervention.	_____2-12_____
	WHAT	
3.	Materials: Describe any physical or informational materials used in the intervention, including those provided to participants or used in intervention delivery or in training of intervention providers. Provide information on where the materials can be accessed (e.g. online appendix, URL)	_____8-17_____
4.	Procedures: Describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.	_____8-17_____
	WHO PROVIDED	
5.	For each category of intervention provider (e.g. psychologist, nursing assistant), describe their expertise, background and any specific training given.	_____11_____
	HOW	
6.	Describe the modes of delivery (e.g. face-to-face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group.	_____11, 17-18_____
	WHERE	
7.	Describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features.	_____17_____

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WHEN and HOW MUCH		
8.	Describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity or dose.	___10, 17___
TAILORING		
9.	If the intervention was planned to be personalised, titrated or adapted, then describe what, why, when, and how.	___8-12, 15-17___
MODIFICATIONS		
10. [†]	If the intervention was modified during the course of the study, describe the changes (what, why, when, and how).	___N/A___
HOW WELL		
11.	Planned: If intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them.	___11___
12. [†]	Actual: If intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned.	___21-22___

**** Authors** - use N/A if an item is not applicable for the intervention being described. **Reviewers** – use ‘?’ if information about the element is not reported/not sufficiently reported.

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S2 Coach Measures and Results

Coach Measures

Authentic Leadership. We measured coaches' perceptions of their authentic leadership behaviours, as a manipulation check, using the Authentic Leadership Questionnaire (ALQ; Walumbwa et al., 2008). The wording of the questionnaire was changed so that it stated, "When I coach...". The ALQ measures the four components of authentic leadership using 16 items and four subscales: self-awareness (e.g., "I accurately describe how others view my capabilities"); balanced processing (e.g., "I listen to different points of view before coming to a decision"); relational transparency (e.g., "I say exactly what I mean"); and internalized moral perspective (e.g., "I make decisions based on my core values"). The coaches were asked to think about their experiences with their athletes and rate their behaviours on a 5-point scale with 1 corresponding to "*not at all*" and 5 corresponding to "*frequently if not always*". This scale has been found to have good reliability ($\alpha = .85$; Bandura et al., 2018).

Coach Results

Coaches in the intervention group reported lower authentic leadership ($M = 3.68$, $SD = .59$) compared to the control group ($M = 4.22$, $SD = .50$) at Time 1 and, higher authentic leadership ($M = 4.33$, $SD = .35$) compared to the control group ($M = 4.15$, $SD = .36$) at Time 2.

S3

Flow diagram of procedure

