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Who said "there is no 'I' in team"? The effects of observational learning content level on efficacy beliefs in groups

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ABSTRACT

Objectives: To investigate the effects of individual-level observational learning (OL_{INDV}), team-level observational learning (OL_{TEAM}), and multi-level observational learning (OL_{MULTI}) on efficacy beliefs, task cohesion, and performance across three studies in sports teams.

Design: Cross-sectional, experimental and single-case designs were employed across the three studies, respectively.

Method: Study 1 used a cross-sectional design to explore the predictive relationship between OL_{INDV} and OL_{TEAM} use, and collective efficacy and task cohesion in 210 team sports athletes. Study 2 used a repeated-measures experimental design to compare effects of OL_{INDV} versus OL_{TEAM} interventions on collective and self-efficacy in two soccer teams. Study 3 used a single-case A-A-B-B design to assess the effectiveness of OL_{MULTI} interventions on self-efficacy, collective efficacy, task cohesion and performance in an elite age-grade rugby union team across a competitive season.

Results: In study 1, both OL_{INDV} and OL_{TEAM} use predicted collective efficacy, but only OL_{TEAM} use predicted task dimensions of cohesion. In study 2, collective efficacy increased for both the OL_{INDV} and OL_{TEAM} interventions while self-efficacy increased only for the OL_{INDV} intervention. In study 3, visual and effect size analyses indicated increased self-efficacy, collective efficacy task cohesion, and performance for the team during the off- and in-season intervention phases where the OL_{MULTI} interventions were administered alongside usual sporting involvement (training sessions and/or competitive fixtures).

Conclusions: The novel findings of this investigation show that OL_{INDV}, OL_{TEAM} and OL_{MULTI} interventions can enhance efficacy beliefs in practical contexts and warrant application in groups across domains.

Self-efficacy refers to "beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments" and is a central self-referent thought mediating between human knowledge and action (Bandura, 1977, p. 3). Bandura recognised that humans often work towards shared objectives in groups and hold beliefs regarding the group's ability to complete specific tasks. Collective efficacy is "a group's shared belief in its conjoint capability to organise and execute the courses of action required to produce given levels of attainment" (Bandura, 1997, p. 477). Despite this concept being referred to as a 'shared belief', Bandura (1997) recommends that research considers each team member's belief in the team's collective ability and aggregate these individual perceptions to the team-level if deemed suitable for the context. This means individual- and team-level approaches are both appropriate for the study of collective efficacy, especially in situations where teams are complex in structure and function (e.g., sports teams). The importance of collective efficacy to teams lies in its ability to influence their effort, persistence, goal setting and resilience (Morgan, Fletcher, & Sarkar, 2013), and its positive relationship with self-efficacy (Magyar, Feltz, & Simpson, 2004), team cohesion (Paskevich, Brawley, Dorsch, & Widmeyer, 1999) and performance (e.g., Myers, Feltz, & Short, 2004).

With evidence consistently supporting the benefits of high levels of collective efficacy on team functioning, it is important to explore factors that explain how efficacy judgments are made in order to enhance them effectively (Beauchamp & Eys, 2014). Collective efficacy shares similar antecedents to self-efficacy in the form of vicarious experiences, enactive mastery experiences, verbal persuasion, and physiological and emotional states (Bandura, 1997). In addition, at a team-level, leadership, cohesion, and team size are also influential towards collective efficacy (Carron & Hausenblas, 1998). Mastery and vicarious

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experiences are considered the strongest sources of efficacy beliefs (Bandura, 1997), and both sources have been used as components of interventions to successfully enhance self-efficacy and collective efficacy in sport (Ashford, Edmunds, & French, 2010; Shearer, Mellalieu, Shearer, & Roderique-Davies, 2009).

Social cognitive theory (Bandura, 1989) suggests individuals learn social behaviors, attitudes and beliefs through observation of others. According to Feltz and Lirgg (2001), observing your own team working together effectively enhances efficacy beliefs through mastery experiences, while observing another team achieving success enhances efficacy beliefs through vicarious experiences. Consequently, observational learning (OL) interventions containing footage of an individual's team bettering an opponent provide opportunities to learn social behaviors and beliefs (i.e., collective efficacy) and include efficacy information in the form of individual- and team-level mastery and vicarious experiences (Bruton, Mellalieu, & Shearer, 2016b).

Bruton, Mellalieu, and Shearer (2014) conducted a two-study investigation examining team-based OL as a collective efficacy intervention in sports teams. In study one, collective efficacy increased for individuals who viewed positive footage of their own teams' performance and decreased for individuals who viewed negative footage. In study two, collective efficacy increased when individuals viewed familiar and unfamiliar video (their own team/sport vs. an unfamiliar team/sport), with greater increases reported after team members watched their own team performing positively. Bruton et al. noted the potential for OL as a collective efficacy intervention and outlined the importance of OL content valence (positive vs. negative) and familiarity (familiar vs. unfamiliar) when developing these interventions.

Efficacy beliefs hold a strong positive association at the individual- (self-efficacy) and team-level (collective efficacy), meaning team members need high confidence in their own ability as well as the team's capabilities for the team to function effectively (Bandura, 1997; Magyar et al., 2004). Despite literature showing that team-level observational learning interventions (OL_{TEAM}) increase collective efficacy (Bruton et al., 2014) and individual-level observational learning interventions (OL_{INDV}) increase self-efficacy (see Ste-Marie et al., 2012), no research has considered the influence of OL content level (individual vs. team) on the effectiveness of OL interventions for self-efficacy and collective efficacy development in sports teams. In the current paper, we systematically explore this research question using three studies with sports teams. According to Wesch, Law, and Hall (2007), OL forms a key component of participation and development in sports teams and this can serve learning (e.g., demonstration of set-plays and team tactics) and performance (e.g., reviewing performance footage to identify strengths and weaknesses) functions. For a team to be effective, individual team members need to perform role-specific actions whilst interacting effectively with other members of the team, placing importance on both individual- and team-levels of functioning. In the context of this study, this suggests sports teams provide an optimal platform to investigate the effects of OL_{INDV} and OL_{TEAM} on teams as they are familiar with OL use across the different levels being investigated. In line with maximum variation sampling (Patton, 2002), we recruited athletes from a variety of team sports and performance standards across the three studies included in this investigation to increase the generalizability of our findings to the team sport setting.

In study 1, we adopted a cross-sectional study design to compare the predictive ability of OL_{INDV} and OL_{TEAM} use towards collective efficacy and task-based dimensions of cohesion in team sports athletes. OL_{INDV} use holds a strong positive relationship with performance and self-efficacy (see Ste-Marie et al., 2012 for a review), two variables that are closely associated with collective efficacy in athletic populations (cf. Fransen, Mertens, Feltz, & Boen, 2017). In sport, collective efficacy beliefs are based on judgments about a teams' ability to perform in competitive fixtures. Competitive team performance encompasses individual team members executing role-specific tasks and regulating psychological responses, and all team members interacting with one another to complete coordinated team actions. These requirements align closely with the skill (i.e., individual task execution), performance (i.e., psychological regulation), and strategy (i.e., coordinated team actions) functions proposed for OL in sport (Cumming, Clark, Ste-Marie, McCullagh, & Hall, 2005). Therefore, we expected OL use to predict collective efficacy in team sports athletes. Collective efficacy is rooted in self-efficacy, so we hypothesized that the relationship between OL use and collective efficacy would exist at both levels (OL_{INDV} and OL_{TEAM}). As a secondary hypothesis, we expected OL_{INDV} and OL_{TEAM} use to predict the task dimensions of team cohesion, as these are positively related to collective efficacy (Kozub & McDonnell, 2000) and OL use is predominantly task-related in sport (Cumming et al., 2005).

In study 2, we used a repeated-measures experimental design to compare the effects of OL_{INDV} versus OL_{TEAM} interventions on self- and collective efficacy beliefs in two soccer teams. Past research has demonstrated that self- and collective efficacy can be increased using both OL_{INDV} and OL_{TEAM} interventions (see e.g., Barker & Jones, 2006; Bruton et al., 2014). However, studies have yet to compare the effects of different levels of OL intervention on self- and collective efficacy perceptions. Mastery experiences at the respective level (i.e., individual vs. team) are the strongest source of efficacy perceptions (Bruton et al., 2016b; Bruton, Mellalieu, Shearer, Roderique-Davies, & Hall, 2013). Therefore, we predicted that OL_{INDV} interventions (i.e., positive performance footage of the individual observing the video) would produce the greatest increase in self-efficacy and OL_{TEAM} interventions (i.e., positive footage of team performance that does not include the individual observing the video) would produce the greatest increase in collective efficacy.

In study 3, we used a single-case A-A-B-B design to assess the effectiveness of multi-level OL interventions ($OL_{MULTI;}$ including OL_{INDV} and OL_{TEAM} content) on self-efficacy, collective efficacy, task cohesion and performance in an elite age-grade rugby union team across a competitive season. Scientific inquiry into sporting populations typically assesses psychological variables multidimensionally but adopts unidimensional measures of performance, despite performance enhancement being the main outcome of sport science practice (Rees, Hardy, & Ingledew, 2000). Single-case designs provide a framework for understanding intervention effects across time, an important factor for sports teams as they are judged on the success of multiple performances across a season (cf. Barker, Mellalieu, McCarthy, Jones, & Moran, 2013). Research to date has employed single-case research methods to study the effects of imagery on confidence (Callow, Hardy, & Hall, 2001) and self-modeling on self-efficacy (Ram & McCullagh, 2003), but has yet to investigate the longitudinal effects of OL interventions in sports teams. Therefore, the purpose of study 3 was to combine the OL_{INDV} and OL_{TEAM} interventions adopted in study 2 and examine the effectiveness of OL_{MULTI} interventions across a competitive season with an elite age-grade rugby union team. Based on recent findings of Bruton et al. (2014) and the capacity for OL interventions to provide mastery experiences at the individual- and team-level, we hypothesized that self- and collective efficacy would increase for the elite age-grade rugby union team after exposure to the OL_{MULTI} interventions. Due to efficacy beliefs being positively associated with task cohesion (e.g., Carron, Bray, & Eys, 2002b) and sport performance (see Chow & Feltz, 2014), we hypothesized that the OL_{MULTI} interventions would also lead to improvements in these variables.

1. Study 1

1.1. Method

1.1.1. Participants

Participants ($N = 210$) were an opportunistic sample of male ($n = 130$, $M_{age} = 23.89$ years, $SD_{age} = 6.47$ years) and female team sports athletes ($n = 80$, $M_{age} = 20.59$ years, $SD_{age} = 3.14$ years) from the United Kingdom. Participants represented eighteen different team sports, meaning responses were recorded at different points in the season (i.e., pre-, during, or post-season) across the athletes recruited for this study. The study sample had played for their current team for a mean of 3.01 years (SD = 3.74 years) with the competitive level of the teams comprising amateur (n = 31), collegiate (n = 98), regional representative (n = 34), semi-professional (n = 30), professional (n = 8), and international (n = 9).

1.1.2. Measures

1.1.2.1. Observational learning use. The Functions of Observational Learning Questionnaire (FOLQ; Cumming et al., 2005) was used to assess team sports athletes' use of observational learning in sport. The FOLQ consists of 17 items across three functions of athlete observational learning use: skill (6 items); strategy (5 items); or performance (6 items). In addition to individual-level use (OL_{INDV}; "*I use observational learning to* …"), in this study the FOLQ was adapted for use at the team-level (OL_{TEAM}; "*my team uses observational learning to* …"). For example, an item from the skill subscale that originally read "I use OL to make up new plans/strategies in my head" was adjusted to read "My team uses OL to make up new plans/strategies in our heads". To ensure adequate face validity of the adjusted questionnaire, the first author edited all items to reflect a team-level orientation and distributed this to other members of the authorship team for review. Based on the recommendations of Dunn, Bouffard, and Rogers (1999), the second and third authors were asked to independently group each item based on the three functions of observational learning use originally proposed by Cumming et al. and rate the relevance of the content included for each item using a likert scale between 1 (poor match) and 5 (excellent match). The authorship team accurately grouped all items based on the three functions of OL use and rated the match as excellent for the 17 adapted items. Participants were required to rate the frequency they/their team used observational learning on a 7-point likert scale ranging from 1 *(rarely)* to 7 *(often)*. Cumming et al. demonstrated strong internal reliability of the three FOLQ functions for individual and team sport athletes (α *range* = 0.84-0.90), with similar findings evident for OL_{TEAM} and OL_{INDV} functions in this study (α *range* = 0.84-0.89).

1.1.2.2. Collective efficacy. The Collective Efficacy Questionnaire for Sports (CEQS; Short, Sullivan, & Feltz, 2005) was used to measure team sports athletes' collective efficacy perceptions. The CEQS is a 20-item questionnaire that asks individuals to "*Rate your team's confidence in terms of upcoming competition, that your team has the ability to* … *"* on a 10-point scale ranging between 0 *(not at all confident)* and 9 *(completely confident)*. The CEQS consists of five factors (effort, persistence, ability, preparation, and unity) that can be combined to create a composite collective efficacy score. Confirmatory factor analysis by Short et al. provided strong factorial validity for the CEQS ($\chi 2(160)$ = 574.29, p < .001, NNFI = 0.90, CFI = 0.92, SRMR = 0.04, RMSEA = 0.09 (90% CI = 0.87–0.104)). Strong internal reliability coefficients have been reported (α *range* = 0.85-0.96, Bruton et al., 2014; Short et al., 2005) with a similarly high score reported in this study (α = 0.95).

1.1.2.3. Task cohesion. A positively worded version of the Group Environment Questionnaire (GEQ; Eys, Carron, Bray, & Brawley, 2007) was used to assess task-related dimensions of team cohesion in team sports athletes. Specifically, 9 of the 18 items from this questionnaire were included to address two factors: Individual attractions to group-task (ATG-T), which reflects a member's feelings about their personal involvement with the group's task; group integration-task (GI-T), which reflects a member's perceptions of the similarity and unification of the group around their tasks and objectives. Responses were made on a 9-point likert scale ranging between 1 *(strongly disagree)* and 9 *(strongly agree)*. Eys et al. reported acceptable internal reliability for each of the GEQ factors (α *range* = 0.74 - 0.86), with similar findings evident for the two factors used in this study (ATG-T, α = 0.70; GI-T, α = 0.85).

1.1.3. Procedure

Ethical approval was granted by the lead author's university ethics committee for all three studies, and all participants provided informed consent before taking part. An online survey was created that included a demographic sheet, the FOLQ (OL_{INDV} or OL_{TEAM}), the CEQS, and two task-related factors of the GEQ (ATG-T, GI-T). Over a 6-month period, team sports athletes were provided with a link to the online survey developed using the Qualtrics surveying platform (www.qualtrics.com). Participants were either presented with the OL_{TEAM} (odd-number participants) or the OL_{INDV} (even-number participants) versions of the FOLQ, as sorted by Qualtrics. Based on exclusion of incomplete survey responses, 102 participants completed the OL_{TEAM} based survey, and 108 participants completed the OL_{INDV} based survey. The online survey took approximately 15 min to complete.

1.1.4. Data analysis

Statistical procedures for the studies were conducted using an upper-bound significance value of p = .05. First, data were screened for univariate normality, multivariate normality, and multicollinearity. Next, six simple regression analyses were used to examine if total OL_{TEAM} and OL_{INDV} scores predicted CEQS, ATG-T and GI-T scores in the two study sub-samples.

1.2. Results

1.2.1. Data screening

Cook's distances were used to examine the assumptions of multivariate normality, with a value greater than 1 indicative of multivariate outliers (cf. Cook & Weisberg, 1982). For all regression analyses Cook's distance values were below 1 with a maximum value of 0.30 (M = 0.01, SD = 0.02), indicating that no single case had a large influence on the respective model, leaving 102 cases for OL_{TEAM} and 108 cases for OL_{INDV} analyses. The variance inflation factor values were all below 10 (M = 6.62, SD = 1.37), and the tolerance statistics were above 0.1 (M = 0.16, SD = 0.03), indicating no issues with multicollinearity within the data (Field, 2018).

1.2.1.1. OL: collective efficacy. Simple regression analyses identified that both OL_{TEAM} and OL_{INDV} predicted collective efficacy scores. Specifically, total OL_{TEAM} scores accounted for 10.0% of variability in collective efficacy, $\beta = 0.33$, R^2 change = 0.11, F [1, 100] = 12.20, $p < .001$, and total OL_{INDV} scores accounted for 14.7% of variability in collective efficacy, $\beta = 0.39$, R^2 change = 0.16, F [1, 106] = 19.47, $p < .001$.

1.2.1.2. OL: task cohesion. Simple regression analyses identified that OL_{TEAM} predicted task cohesion and OL_{INDV} partially predicted task cohesion scores. Specifically, total OL_{TEAM} scores accounted for 9.6% of variability in ATG-T, $\beta = 0.33$, R^2 change = 0.11, F [1, 100] = 11.77, $p < .001$, and 4.5% of variability in GI-T, $\beta = 0.21$, R^2 change = 0.05, F [1, 100] = 4.99, $p = .03$, whereas total OL_{INDV} scores did not account for variability in ATG-T, $\beta = 0.14$, R^2 change = 0.02, F [1, 106] = 2.11, $p = .15$, but did account for 3.6% of variability in GI-T, $\beta = 0.21$, R^2 change = 0.05, F [1, 106] = 4.99, $p = .03$.

2. Study 2

The findings from study 1 show that team sports athletes' frequency of OL_{INDV} and OL_{TEAM} use predicts perceptions of collective efficacy and task cohesion. Therefore, the purpose of study 2 was to compare the effects of OL_{INDV} versus OL_{TEAM} interventions on self-efficacy and collective efficacy beliefs in team sports athletes.

2.1. Method

2.1.1. Participants

Participants ($N = 22$) were purposefully recruited from a men's ($n = 11$, $M_{age} = 21.73$ years, $SD_{age} = 1.51$ years) and women's soccer team ($n = 11$, $M_{age} = 21.94$ years, $SD_{age} = 1.76$ years) at a university in the United Kingdom. Soccer is an ideal sport for the study of OL intervention content level as competitive performance requires high interdependence between team members, but also involves considerable bouts of individual performance (e.g., dribbling with the ball, taking set-pieces, shooting at goal).

2.1.2. Measures

2.1.2.1. Collective efficacy. As for study one, collective efficacy was measured using the CEQS (Short et al., 2005), which indicated strong internal reliability for the sample at all four time-points (α *range* = 0.97-0.98).

2.1.2.2. Self-efficacy. Self-efficacy was measured using the Self-Efficacy Questionnaire for Soccer (SEQ-S; Mills, Munroe, & Hall, 2000). Mills et al. developed this 5-item instrument to assess soccer players self-efficacy across five mental aptitudes important to soccer performance. The five items read: *"I am confident I can work through difficult situations"; "I am confident I can remain focussed during a challenging situation"; "I am confident I can be mentally tough throughout a competition"; "I am confident I can remain in control in challenging situations"; "I am confident I can appear confident in front of others"*. Participants rated each item on an 11-point likert scale ranging from 0 (*no confidence*) to 10 (*complete confidence)*. Previous studies by Munroe-Chandler and colleagues employing the SEQ-S (Mills et al., 2000; Munroe-Chandler et al., 2008) have reported adequate internal reliability scores (α *range* = 0.86-0.91), with similar scores reported at all four time-points in this study (α *range* = 0.82-0.90).

2.1.3. Procedure

Based on procedures adopted by Bruton et al. (2014) for developing team-based OL interventions, video footage of performances was collected over a 6-week period, with three competitive fixtures recorded per team to allow the primary researcher to develop balanced positive OL_{INDV} and OL_{TEAM} interventions that contained adequate footage of all team members. The recorded footage was edited into multiple clips displaying successful individual ($M_{clips} = 15$ per individual) and team ($M_{clips} = 24$ per team) performance with the assistance of the respective team coaches. Specifically, each OL_{TEAM} intervention lasted 75 s and included seven 10–12 s clips that displayed successful team performance across all aspects of soccer performance (defence, midfield, attack), whilst ensuring that all team members apart from the observer were included in at least four clips. The observer was excluded from all clips to avoid including OL_{INDV} content in the OL_{TEAM} intervention, meaning all OL_{TEAM} interventions were individualized for the observer. Each OL_{INDV} intervention lasted 75 s and included ten 7–8 s clips that displayed successful individual performance specific to the observer's role in the team.

A repeated-measures experimental design was used to compare the influence of OL_{INDV} versus OL_{TEAM} interventions on self- and collective efficacy. Participants watched both OL_{INDV} and OL_{TEAM} interventions (video duration = 75 s per intervention) across two separate experimental sessions one week apart. The order of this exposure to the interventions was randomized and counterbalanced, meaning half the participants watched the OL_{INDV} intervention in the first session and OL_{TEAM} intervention in the second session, and half watched the interventions in the opposite order. Data collection comprised a three-step process. To begin, participants completed the CEQS and SEQ-S (pre-intervention), after which the intervention was administered. Once the respective OL intervention was watched in full, the participant completed the CEQS and SEQ-S for a second time (post-intervention). On completion of both interventions, a brief semi-structured social validation interview was conducted with each participant to gather perceptions about the two interventions (Page & Thelwell, 2013). Questions related to perceived effects of the OL_{INDV} and OL_{TEAM} interventions on the dependent variables ('do you think watching your individual/team performances increased: (1) your confidence in your own capabilities?; (2) your confidence in your team's capabilities?'); and why they thought the video footage did/did not have an effect ('if yes/no why do you believe the effect did/did not exist?'). Finally, participants were debriefed on the study aims and thanked for their involvement.

2.1.4. Data analysis

Data was screened for normality using the Shapiro-Wilk test and for skewness and kurtosis using descriptive statistics. A repeated 2 (Intervention: OL_{INDV}, OL_{TEAM}) x 2 (Test phase: Pre-intervention, Post-intervention) ANOVA was used to examine the data for main effects and interactions. Partial eta squared (η_p^2) values were reported for the main and interaction effects, and the effect size values were interpreted using Cohen's (1988) classifications for a small (0.01), medium (0.06), and large effect (0.14). To reduce type I error rates, Fisher's least significant difference (LSD) contrasts were used for post-hoc pairwise comparisons as less than four conditions were compared (Carmer & Swanson, 1973). Social validation interview data was analyzed using Braun and Clarke's (2006) six-step thematic analysis procedures. The data analysis involved: (1) familiarization with the data; (2) transcription of the audio recorded interviews; (3) identification of the initial codes; (4) identification of themes; (5) naming, reorganizing and completing the themes; and (6) theme comparison and write-up with reference to existing research regarding OL interventions and efficacy enhancement (e.g., Bandura, 1997; Bruton et al., 2014, 2016b).

2.2. Results

2.2.1. Data screening

The Shapiro-Wilk test identified normal distribution for self-efficacy (D [22] = 0.91-0.97, $p > .05$) and collective efficacy scores (D [22] = 0.96-0.97, $p > .05$), and descriptive statistics revealed skewness and kurtosis values within allowable thresholds at all time points (+1 to −1; +2 to −2).

2.2.2. Collective efficacy scores

The repeated-measures 2 × 2 ANOVA results for collective efficacy scores suggested a main effect within-subjects for test phase (F [1, 21] = 33.87, $p < .001$, $\eta_p^2 = 0.62$) and intervention (F [1, 21] = 6.06, $p = .02$, $\eta_p^2 = 0.22$), but no interaction between intervention and test phase (F [1, 21] = 0.05, $p = .82$, $\eta_p^2 = 0.00$). Closer inspection of the score profiles (Fig. 1) indicated that collective efficacy scores increased for the OL_{INDV} intervention between pre- ($M = 7.37$, $SD = 1.24$) and post-intervention ($M = 7.87$, $SD = 1.11$), with a similar increase reported for the OL_{TEAM} intervention between pre- ($M = 7.26$, $SD = 1.25$) and post-intervention ($M = 7.78$, $SD = 1.21$) test phases.

2.2.3. Self-efficacy scores

The repeated-measures 2 × 2 ANOVA results for self-efficacy scores (Fig. 1) suggested a main effect for test phase (F [1, 21] = 8.55, $p = .01$, $\eta_p^2 = 0.29$), no main effect between groups for intervention (F [1, 21] = 2.05, $p = .17$, $\eta_p^2 = 0.09$), and an interaction between intervention and test-phase (F [1, 21] = 7.91, $p = .01$, $\eta_p^2 = 0.27$). Simple effects analysis indicated that self-efficacy scores increased between pre- ($M = 7.92$, $SD = 0.95$) and post-intervention ($M = 8.50$, $SD = 0.79$) for the OL_{INDV} intervention (F [1, 21] = 17.47, $p < .001$), but no such difference was reported between pre- ($M = 8.06$, $SD = 0.92$) and post-intervention ($M = 8.22$, $SD = 0.92$) for the OL_{TEAM} intervention (F [1, 21] = 1.00, $p = .33$). There was no difference in self-efficacy scores between interventions at pre-intervention (F

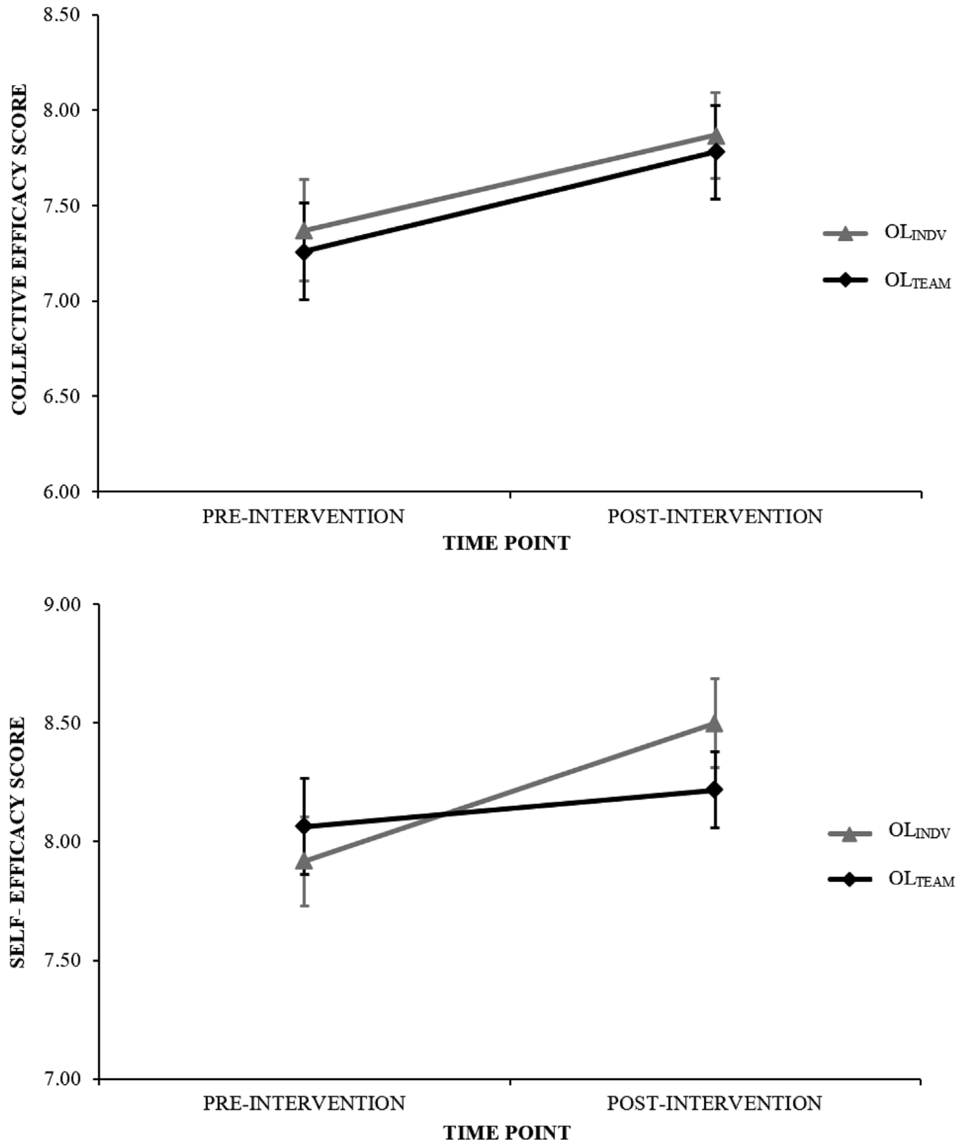

Fig. 1. Mean collective and self-efficacy scores at pre- and post-intervention for OL_{INDV} and OL_{TEAM} intervention conditions.

[1, 21] = 2.54, p = .13), but scores for the OL_{INDV} intervention were higher than OL_{TEAM} intervention scores post-intervention (F [1, 21] = 10.27, $p < .001$).

2.2.4. Social validation

2.2.4.1. Collective efficacy. All participants indicated that OL_{TEAM} videos enhanced collective efficacy, and eighteen (81.8%) participants reported OL_{INDV} videos enhanced collective efficacy. When asked why they perceived OL_{TEAM} video to have this effect, participants suggested it reminded them about the strengths of all team members and their ability to perform together as a collective unit (team mastery and vicarious experiences). For example, participant 8 stated, "*Watching the video reminded me of all things we practice together as a team … we are all good players and it showed me how effective we can be when working together*". For participants who perceived the OL_{INDV} video as beneficial, the footage was suggested to increase the athlete's confidence in his/her own capabilities and triggered imagery of the team performing in a similar manner (individual mastery and team imaginal experiences). For example, participant 20 said, "*It made me reflect on the aspects of performance that I do well and made me think that the team succeeds when I perform like this"*.

2.2.4.2. Self-efficacy. Twelve (54.5%) participants reported OL_{TEAM} videos benefitted self-efficacy, and twenty-one (95.5%) participants indicated OL_{INDV} videos benefitted self-efficacy. For participants who perceived the OL_{TEAM} video as beneficial, it was suggested that the athletes could imagine themselves performing their role-specific tasks well in conjunction with the team footage (positive individual imaginal experiences). For example, participant 2 stated, "*The video showed me how well I fit into this team, and that the team's style of play matches closely with mine*". For participants who perceived the OL_{INDV} video as beneficial, the videos were reported to increase their confidence in all aspects of soccer performance (individual mastery experiences). For example, participant 22 reported, "*It was nice to watch highlights of my performance as it shows that you're a good player and makes you want to get out there and play like this again"*.

3. Study 3

The findings from study 2 indicate that both OL_{INDV} and OL_{TEAM} interventions increase collective efficacy, but only OL_{INDV} interventions increase self-efficacy in team sports athletes. The purpose of study 3 is to examine the effects of OL_{MULTI} interventions on self-efficacy, collective efficacy, task cohesion and performance across a season-long period with an elite age-grade rugby union team.

3.1. Method

3.1.1. Study design

This study adopted a single-case experimental design with an A-A-B-B format to coincide with a twenty-eight-week competitive rugby season. Phase A^1 was the pre-season baseline phase (7 weeks), phase A^2 was the in-season baseline phase (7 weeks), phase B^1 was the mid-season intervention phase (7 weeks), and phase B^2 was the in-season intervention phase (7 weeks).

3.1.2. Participants

Participants were twenty-two male elite age-grade rugby union players from an under 18's Regional squad in the United Kingdom, including eleven in each of the forward and backs groups (categories of rugby union field positions) aged between sixteen and eighteen years (M_{age} = 16.5 years, SD_{age} = 0.5 years).

3.1.3. Measures

3.1.3.1. Collective efficacy. Collective efficacy was assessed using a single-item measure adapted from a question stem developed and validated for collective efficacy measurement in team sports (Bruton, Mellalieu, & Shearer, 2016a). The validated stem reads: *'Rate your team's confidence in their ability to … '* and the following content was added to develop a single-item measure of collective efficacy for use with elite age-grade rugby union players: *' … perform to a high level, in order to achieve success in their next competitive rugby fixture'*. All responses to the collective efficacy measure were rated on a confidence scale between 0 (*not at all confident*) and 100 (*completely confident*).

3.1.3.2. Self-efficacy. Self-efficacy was assessed using a single-item adapted from Bruton et al.'s (2016a) collective efficacy measure. Specifically, the measure read: '*Rate your confidence in your ability to perform to a high level, in order to achieve success in your next competitive rugby fixture*'. All responses to the self-efficacy measure were rated on a confidence scale between 0 (*not at all confident*) and 100 (*completely confident*).

3.1.3.3. Task cohesion. Task cohesion was assessed using a bespoke two-item measure in line with Carron and colleagues' (see e.g., Carron, Brawley & Widmeyer, 2002a; Carron, Widmeyer, & Brawley, 1985) suggestion that the dimensions of cohesion are treated as related, but distinct concepts. Carron et al.'s descriptions of the task-related aspects of cohesion (ATG-T, GI-T) were used to develop the respective items. The ATG-T item read *'Rate your personal involvement within this team during both practice sessions and competitive performances'* and the GI-T item read *'Rate the closeness of your team as a whole during both practice sessions and competitive performances'*. Responses to the ATG-T item were rated between 0 (*not involved at all*) and 100 (*highly involved*), and responses to the GI-T item were rated between 0 (*not close at all*) and 100 (*very close*).

3.1.3.4. Performance. Team performance in rugby is multifaceted, as evidenced by the wealth of performance indicators adopted in this sport (Bennett, Bezodis, Shearer, Locke, & Kilduff, 2019). In this study, performance was measured using twenty-three performance indicators that represent overall rugby performance, as collected by the performance analysis unit of the elite age-grade rugby union team. This included: tries scored for/against, conversions scored for/against, penalty kicks scored for/against, total points scored for/against, possession (%), territory (%), ball carries, passes, ball in hand, turnovers conceded, attacking scrum success (%), attacking lineout success (%), attacking restart success (%), turnovers gained, tackle success (%), penalties conceded, defensive scrum success (%), defensive lineout success (%), and defensive restart success (%).

3.1.3.5. Social validation. A social validation interview was completed with each participant at the end of the study to gain insight into team members' perceptions of the interventions administered across the two intervention phases (cf. Turner & Barker, 2013). The interview comprised open-ended questions asking participants about the perceived effects of the OL $_{MULTI}$ interventions on the dependent variables ('do you think watching your individual and team performances increased: (1) your confidence in your own capabilities?; (2) your confidence in your team's capabilities?; (3) your perceptions about the closeness of your team during performances?; (4) your team's performances?'), and why they thought the video footage did/did not have an effect ('if yes/no why do you believe the effect did/did not exist?').

3.1.4. Procedure

3.1.4.1. Pre-season baseline phase (A^1). The first baseline phase lasted seven weeks and coincided with the teams' pre-season period, finishing one day before the team's first competitive fixture of the season. During this period, all participants took part in two training sessions per week. The researchers met with the squad weekly, prior to the first training session, to record pre-season baseline data. Data collection across all four phases of this study required the players to record responses for collective efficacy, task cohesion and self-efficacy using the respective single- and two-item measures.

3.1.4.2. In-season baseline phase (A^2). The in-season baseline phase lasted seven weeks and coincided with the first set of competitive fixtures for the season. During this period, all participants took part in one training session per week and the team had four competitive fixtures. The researchers met with the squad weekly, prior to the first training session, to record in-season baseline data.

3.1.4.3. Mid-season intervention phase (B^1). The mid-season intervention phase lasted seven weeks and coincided with the teams' mid-season break period. This phase began one day after the last competitive fixture of the in-season baseline period and ended the day before the second set of competitive fixtures for the season. During this phase, data collection was to coincide with the completion of a weekly OL $_{MULTI}$ intervention, lasting 10 min in total. The intervention comprised high definition footage of previous performances, as recorded by the performance analysis sub-team at the rugby union team. Each OL $_{MULTI}$ intervention used video footage from the four fixtures completed during the in-season baseline phase. The interventions were developed to maximize exposure to positive performance footage while minimizing interruption of the team's usual schedule. Guidelines from study 2 were followed when selecting the video content as each intervention included balanced individual content across the twenty-two players (OL_{INDV}) in addition to balanced team content across attacking and defensive aspects of rugby performance (OL_{TEAM}). On arrival at the first weekly training session the squad was informed they were to view performance footage from recent competitive fixtures. All squad members took a seat in the meeting room and the 10-min OL_{MULTI} intervention was presented on a high-definition 3.05 m (16:9) projector screen. After the intervention finished, each squad member recorded responses for the three psychological variables.

3.1.4.4. In-season intervention phase (B^2). The in-season intervention phase lasted seven weeks and coincided with the teams' second set of competitive fixtures for the season. During this period, all participants took part in one weekly training session and four competitive fixtures. Weekly data collection coincided with completion of an OL_{MULTI} intervention that followed the same format as the interventions for the mid-season intervention phase. Each intervention included unused

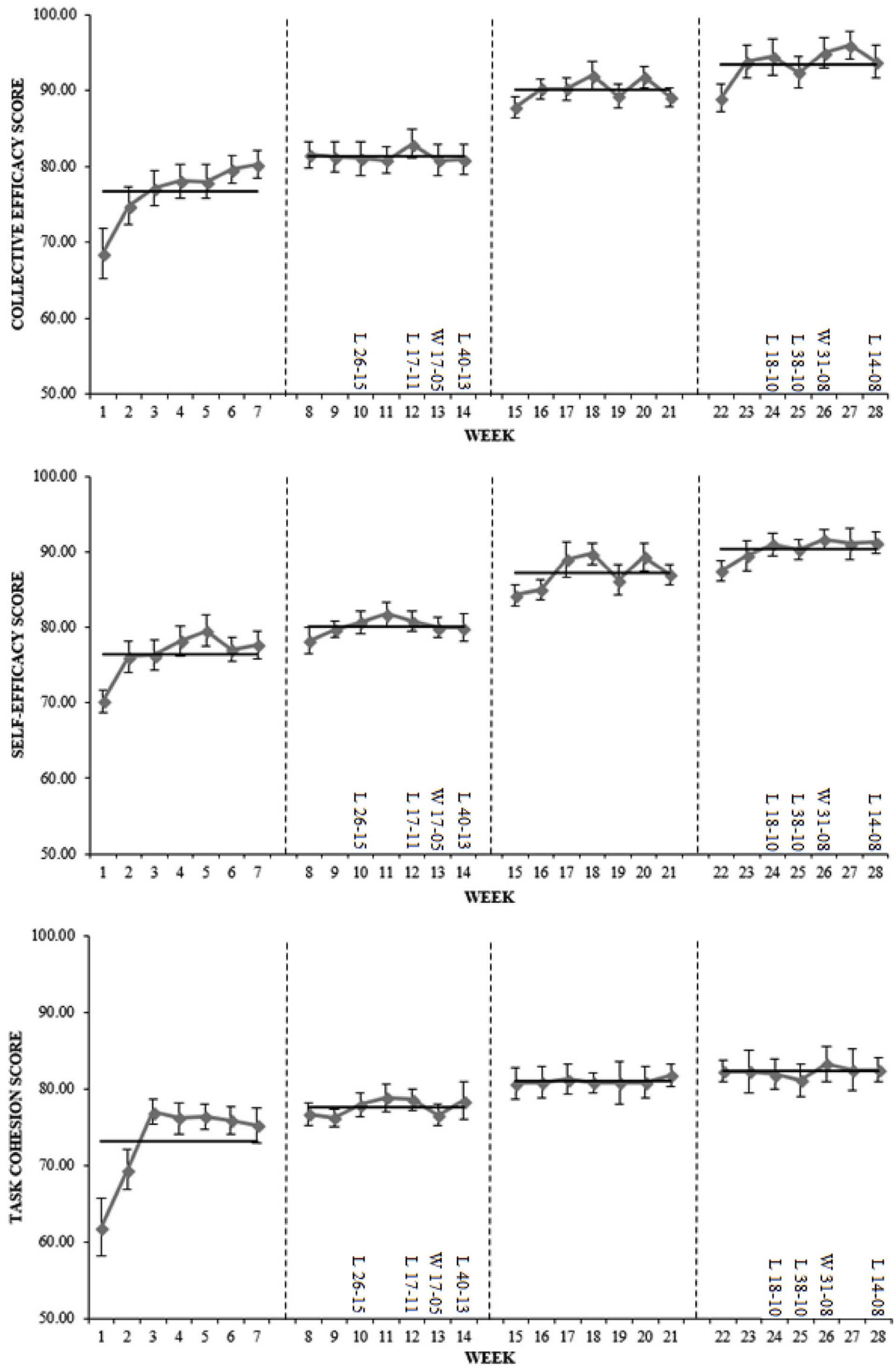

Fig. 2. The team's week-by-week collective efficacy, self-efficacy and task cohesion scores for the season-long study period. *Note:* dotted line indicates change between experimental phases; 'W' indicates the team won a competitive fixture during that week; 'L' indicates the team lost a competitive fixture during that week; scores following 'W' or 'L' represent points scored by winning team and losing team.

footage from the four fixtures completed during the in-season baseline phase combined with new footage available from the fixtures completed during this phase. Again, responses for the three psychological variables were recorded after the intervention was complete.

3.1.5. Data analysis

Analysis of the intervention effect on collective efficacy, self-efficacy and task cohesion involved two steps. First, graphs of the single-case data (Fig. 2) were visually inspected for level (mean value), trend (gradient of change), and variability (range of spread) within each phase, and the immediacy of the effect (change in level, trend, and variability) and overlap (proportion of data points overlapping) between phases (Kratochwill et al., 2010). Second, Cohen's (1988) *d* effect sizes were calculated for the three transitions between phases to account for the possibility of small effects in applied behavior research (Gage & Lewis, 2013). Intervention effects on team performance were analyzed using Cohen's *d* effect size calculations for each team

Table 1
Descriptive statistics and Cohen's d effect size calculations for performance indicators from competitive fixtures during in-season baseline and intervention phases.

	In-season Baseline		In-season Intervention		M_{diff}	ES (*d*)
	M	SD	M	SD		
Tries scored for	1.50	0.58	2.25	1.89	0.75	0.54
Tries scored against	2.50	1.73	2.50	2.38	0.00	0.00
Conversions scored for	1.00	0.82	1.00	1.41	0.00	0.00
Conversions scored against	1.75	1.26	1.25	1.89	−0.50	−0.31
Penalty kicks scored for	1.50	0.58	0.50	0.58	−1.00	−1.72
Penalties kicks scored against	2.00	1.83	1.50	1.29	−0.50	−0.32
Total Points scored for	14.00	2.58	14.75	10.87	0.75	0.09
Total Points scored against	22.00	14.76	20.00	12.44	−2.00	−0.15
Possession (%)	43.25	4.57	53.25	3.10	10.00	2.56
Territory (%)	46.00	3.83	56.25	7.37	10.25	1.75
Ball carries	60.00	3.37	78.00	15.30	18.00	1.62
Passes	64.50	4.73	89.00	16.86	24.50	1.98
Ball in hand	150.00	14.90	196.50	41.63	46.50	1.49
Turnovers conceded	20.00	3.27	15.75	1.71	−4.25	−1.63
Attacking scrum success (%)	89.25	14.64	90.00	7.35	0.75	0.06
Attacking lineout success (%)	62.50	9.33	70.50	7.92	8.00	0.92
Attacking restart success (%)	95.75	8.50	97.00	3.42	1.25	0.19
Turnovers gained	19.25	3.59	24.00	1.38	4.75	1.75
Tackle success (%)	70.50	3.70	87.50	2.08	17.00	5.66
Penalties conceded	10.75	2.75	10.00	3.46	−0.75	−0.24
Defensive scrum success (%)	89.50	14.18	98.25	3.50	8.75	0.85
Defensive lineout success (%)	80.00	21.35	71.00	9.44	−9.00	−0.55
Defensive restart success (%)	73.25	9.07	91.75	9.63	18.50	1.98

performance indicator from the four fixtures completed during each in-season phase (Table 1). Cohen's (1992) recommendations were used to interpret effect size values for a small (0.2), medium (0.5), and large effect (0.8). Similar to study 2, social validation interview data was analyzed using Braun and Clarke's (2006) six-step thematic analysis procedures.

3.2. Results

3.2.1. Within-phase analysis for collective efficacy

For the pre-season baseline phase, the collective efficacy scores were the lowest of all four phases (*M* = 76.67, *SD* = 10.85). Weekly mean scores increased by 17.20% from 68.54 to 80.33 between the start and end points of this phase. Scores increased across five weeks and decreased across one week during this period. For the in-season baseline phase, the collective efficacy scores were the second lowest of all four phases (*M* = 81.36, *SD* = 9.13). Weekly mean scores decreased by 0.79% from 81.57 to 80.93 between the start and end points of this phase. Scores increased across two weeks and decreased across four weeks during this period. For the mid-season intervention phase, the collective efficacy scores were the second highest of all four phases (*M* = 90.09, *SD* = 6.84). Weekly mean scores increased by 1.52% from 87.83 to 89.17 between the start and end points of this phase. Scores increased across four weeks and decreased across two weeks during this period. For the in-season intervention phase, the collective efficacy scores were the highest of all four phases (*M* = 93.52, *SD* = 9.70). Weekly mean scores increased by 5.36% from 89.06 to 93.83 between the start and end points of this phase. Scores increased across four weeks and decreased across two weeks during this period.

3.2.2. Between-phase analysis for collective efficacy

For the first transition, there was a 2.47% increase (*d* = 0.21) in mean collective efficacy scores between the last three weeks of the pre-season baseline phase (*M* = 79.33, *SD* = 9.27) and the first three weeks of the in-season baseline phase (*M* = 81.29, *SD* = 9.33), with no overlapping data-points between the two phases. For the second transition, there was a 9.66% increase (*d* = 0.98) in mean collective efficacy scores between the last three weeks of the in-season baseline phase (*M* = 81.58, *SD* = 9.32) and the first three weeks of the mid-season intervention phase (*M* = 89.46, *SD* = 6.46), with no overlapping data-points between the two phases. For the third transition, there was a 2.62% increase (*d* = 0.28) in mean collective efficacy scores between the last three weeks of the mid-season intervention phase (*M* = 90.09, *SD* = 6.62) and the first three weeks of the in-season intervention phase (*M* = 92.45, *SD* = 9.93), with one overlapping data-point between the two phases.

3.2.3. Within-phase analysis for self-efficacy

For the pre-season baseline phase, the self-efficacy scores were the lowest of all four phases (*M* = 76.47, *SD* = 8.73). Weekly mean scores increased by 10.61% from 60.25 to 77.70 between the start and end points of this phase. Scores increased across four weeks and decreased across two weeks during this period. For the in-season baseline phase, the self-efficacy scores were the second lowest of all four phases (*M* = 80.16, *SD* = 6.85). Weekly mean scores increased by 2.24% from 78.21 to 79.96 between the start and end points of this phase. Scores increased across four weeks and decreased across two weeks during this period. For the mid-season intervention phase, the self-efficacy scores were the second highest of all four phases (*M* = 87.24, *SD* = 7.84). Weekly mean scores increased by 3.24% from 84.27 to 87.00 between the start and end points of this phase. Scores increased across four weeks and decreased across two weeks during this period. For the in-season intervention phase, the self-efficacy scores were the highest of all four phases (*M* = 90.33, *SD* = 7.29). Weekly mean scores increased by 4.35% from 87.43 to 91.23 between the start and end points of this phase. Scores increased across four weeks and decreased across two weeks during this period.

3.2.4. Between-phase analysis for self-efficacy

For the first transition, there was a 1.82% increase (*d* = 0.19) in mean self-efficacy scores between the last three weeks of the pre-season baseline phase (*M* = 78.11, *SD* = 8.46) and the first three weeks of the in-season baseline phase (*M* = 79.53, *SD* = 6.65), with one overlapping data-point between the two phases. For the second transition, there was a 7.29% increase (*d* = 0.78) in mean self-efficacy scores between the last three weeks of the in-season baseline phase (*M* = 80.24, *SD* = 6.90) and the first three weeks of the mid-season intervention phase (*M* = 86.08, *SD* = 8.00), with no overlapping data-points between the two phases. For the third transition, there was a 2.02% increase ($d = 0.23$) in mean self-efficacy scores between the last three weeks of the mid-season intervention phase ($M = 87.55$, $SD = 8.05$) and the first three weeks of the in-season intervention phase ($M = 89.32$, $SD = 7.60$), with two overlapping data-point between the two phases.

3.2.5. Within-phase analysis for task cohesion

For the pre-season baseline phase, the task cohesion scores were the lowest of all four phases ($M = 73.21$, $SD = 10.67$). Weekly mean scores increased by 21.43% from 61.99 to 75.27 between the start and end points of this phase. Scores increased across three weeks and decreased across three weeks during this period. For the in-season baseline phase, the task cohesion scores were the second lowest of all four phases ($M = 77.70$, $SD = 7.62$). Weekly mean scores increased by 2.34% from 76.78 to 78.58 between the start and end points of this phase. Scores increased across three weeks and decreased across three weeks during this period. For the mid-season intervention phase, the task cohesion scores were the second highest of all four phases ($M = 81.08$, $SD = 9.12$). Weekly mean scores increased by 1.30% from 80.81 to 81.86 between the start and end points of this phase. Scores increased across four weeks, decreased across one week, and stayed the same across one week during this period. For the in-season intervention phase, the task cohesion scores were the highest of all four phases ($M = 82.34$, $SD = 9.86$). Weekly mean scores increased by 0.21% from 82.41 to 82.58 between the start and end points of this phase. Scores increased across one week, decreased across four weeks, and stayed the same across one week during this period.

3.2.6. Between-phase analysis for task cohesion

For the first transition, there was a 1.50% increase ($d = 0.14$) in mean task cohesion scores between the last three weeks of the pre-season baseline phase ($M = 75.89$, $SD = 9.13$) and the first three weeks of the in-season baseline phase ($M = 77.04$, $SD = 6.59$), with three overlapping data-points between the two phases. For the second transition, there was a 3.93% increase ($d = 0.34$) in mean task cohesion scores between the last three weeks of the in-season baseline phase ($M = 77.96$, $SD = 8.35$) and the first three weeks of the mid-season intervention phase ($M = 81.03$, $SD = 9.72$), with no overlapping data-points between the two phases. For the third transition, there was a 1.29% increase ($d = 0.11$) in mean task cohesion scores between the last three weeks of the mid-season intervention phase ($M = 81.2$, $SD = 9.51$) and the first three weeks of the in-season intervention phase ($M = 82.25$, $SD = 10.25$), with one overlapping data-point between the two phases.

3.2.7. Between-phase analysis for performance

Large improvements ($d \geq 0.80$) were reported for eleven performance indicators from the four fixtures completed during the in-season intervention phase (Table 1). This included a 23.12% increase ($d = 2.56$) in possession, a 22.28% increase ($d = 1.75$) in territory, a 30.00% increase ($d = 1.62$) in ball carries, a 37.98% increase ($d = 1.98$) in passes, a 31.00% increase ($d = 1.49$) in ball in hand, a 21.25% decrease ($d = 1.63$) in turnovers conceded, a 12.80% increase ($d = 0.92$) in attacking lineout success, a 24.68% increase ($d = 1.75$) in turnovers gained, a 24.11% increase ($d = 5.66$) in tackle success, a 9.78% increase ($d = 0.85$) in defensive scrum success, and a 25.26% increase ($d = 1.98$) in defensive restart success. One performance indicator got worse as the team showed a 66.67% decrease ($d = -1.72$) in penalty kicks scored for during the in-season intervention phase. Small to moderate effects ($d < 0.79$) were reported for the remaining eleven performance indicators.

3.2.8. Social validation

Social validation data collected from the twenty-two players at the end of the study revealed that eighteen of the elite age-grade rugby union players perceived the OL $_{MULTI}$ interventions to have a positive effect on team performance. Two main themes were present when asking the participants why they perceived the interventions to have this effect. First, the intervention gave the athletes confidence that they were a good team and could play well together (building collective efficacy and task cohesion). For example, when asked about the effect of the intervention participant 6 stated, "*The footage … like … shows you how good a team we are … and all the good things that we do well as a team. The set pieces … the tries … the big defence … the big hits … seeing all these things makes me feel better about how good a team we are and how well we can do when we play together*". Second, the intervention helped the athletes to see the positive aspects of their own performances (building self-efficacy). For example, when asked about the effects of the footage participant 19 remarked that, "*I really liked watching the footage … It made me feel good seeing myself and my team mates doing things well in previous matches. It reminded me of all the things I had done well, and the good things we had done well as a team. It made me think about how good I was playing, and it made me excited and confident, and looking forward to going into the next training session and match*".

3.3. Discussion

This investigation examined the novel effects of different OL levels (OL_{INDV}, OL_{TEAM}, and OL_{MULTI}) on collective efficacy, self-efficacy, task cohesion, and performance across three progressive studies in sports teams. Taken together, our findings provide robust support for the use of OL interventions containing positive multi-level footage (i.e., video of positive team and individual behaviors) for efficacy development in sports teams. Study 1 supports the assumption that a team's frequency of OL use predicts its members' perceptions of collective efficacy and task cohesion. Frequency of both OL_{INDV} and OL_{TEAM} use positively predicted collective efficacy, but only frequency of OL_{TEAM} use predicted task cohesion, suggesting that sports teams who used OL more frequently had greater levels of collective efficacy and task cohesion. Bandura's (1989) social cognitive theory states that human beings expand their knowledge, skills, and beliefs through observing, empathizing and making meaning of other's behavior. The findings of our study align with this sentiment and suggest that team sports athletes learn social actions (i.e., position-specific actions, team-related behavior) and develop associated beliefs such as collective efficacy and task cohesion through the modeling of others (teammates and opposition). Our results also support existing empirical findings in sport that show observation-based methods are beneficial towards sport performance and self-efficacy, two variables closely linked to collective efficacy (see Ste-Marie et al., 2012).

Study 2 suggests OL_{INDV} and OL_{TEAM} content is important when manipulating efficacy beliefs through observation interventions. Specifically, we demonstrated that positive footage of individual soccer actions increased individual perceptions of self- and collective efficacy, whereas positive footage of team soccer actions increased collective efficacy. Bandura (1977) suggests collective efficacy is rooted in self-efficacy and the two concepts share the same antecedents, with mastery and vicarious experiences the strongest sources of efficacy perceptions for both units of agency (Bruton et al., 2013; 2016b). For self-efficacy, mastery experiences refer to an athlete's performance accomplishments and vicarious experiences can be gained from watching another athlete performing actions relevant to one's own performances. According to Feltz and Lirgg (2001), these two sources should be considered at the team-level for collective efficacy development, with mastery experiences referring to successful team performances and vicarious experiences concerning the observation of another team performing in a coordinated manner. It is therefore unsurprising that self-efficacy improved after soccer players watched positive examples of their own performance (OL_{INDV} footage) and collective efficacy increased after soccer players watched successful team performance (OL_{TEAM} footage), but it was not expected that collective efficacy beliefs would increase following observation of the OL_{INDV} intervention. Bandura (1997) suggests that an individual must first consider confidence in his/her own capabilities (self-efficacy), before making judgments about the confidence of a team of people (collective efficacy). The social validation data collected supports this finding, with participants suggesting they imagined the team performing in an equally successful manner when viewing their own positive performances. Imaginal experiences are listed as a source of efficacy (Bandura, 1997), with mental imagery successfully used to increase collective efficacy in sports teams (e.g., Munroe-Chandler & Hall, 2004; Shearer et al., 2009), making this a plausible mechanism for OL_{INDV} footage increasing collective efficacy in team sports athletes. In sum, the findings provide substantial evidence that OL_{INDV} and OL_{TEAM} interventions can be used to develop efficacy beliefs in sports teams.

Study 3 supported the use of OL $_{MULTI}$ interventions to increase collective efficacy, self-efficacy, task cohesion, and improve performance across a season. Visual and effect size analyses reported large and immediate increases in the team's aggregated (across team members) collective efficacy, self-efficacy and task cohesion during the intervention phases when compared to baseline. In support of these findings, the participants reported that viewing successful team and individual performance improved efficacy beliefs at both levels. This suggests that the OL $_{MULTI}$ interventions provided the elite age-grade rugby union players with individual- and team-level mastery experiences, the strongest source of efficacy beliefs (Bruton et al., 2013). The results of this study create unique knowledge regarding the effectiveness of OL interventions for efficacy development in sports teams, with potential application across all group domains (see Bruton et al., 2014; 2016b). Our findings make a novel and significant contribution to the existing group dynamics literature by demonstrating that viewing one's own team displaying positive 'team' characteristics and self/other team members displaying positive 'individual' characteristics can lead to increased efficacy beliefs, task cohesion, and performance in sports teams. This investigation is the first to show that OL interventions can be applied with sports teams in an ecologically valid setting and may increase efficacy, cohesion, and team performance in 'real-world' settings.

Despite the systematic nature of this novel multi-study investigation and the importance of our findings to the literature on OL interventions in sports teams, some limitations are acknowledged. In study 1, team sport athletes completed either the OL_{INDV} or OL_{TEAM} measure alongside the collective efficacy and task cohesion scales. This decision was taken to improve measurement accuracy by reducing the fatigue, frustration, and boredom involved with answering similar questions repetitively (cf. Robins, Hendin, & Trzesniewski, 2001). Although mean scores were similar for the demographic and dependent variables for participants who completed the respective surveys, we advise future studies on OL and group dynamics to consider a standard cross-sectional design (participants recording scores for all variables) to control for the influence of population differences on the relationships being tested.

In study 2, we measured self-efficacy using the SEQ-S (Mills et al., 2000), a questionnaire that can be used for all soccer players regardless of position. However, Bandura (2006) advocated that efficacy measures be designed for use in a specific domain and encompass broad performance-based aspects that span the full range of task complexity. This is difficult in team sports as performance characteristics vary across playing positions and competitive level, requiring a researcher to develop a bespoke measure of self-efficacy for each team member involved in the study. Despite this obstacle, robust sport-specific self-efficacy measures have been adopted in previous literature (see e.g., Bruton et al., 2013) and we advise position-specific measures of self-efficacy be developed and validated for use in team sport research.

For study 3, the extensive training/competitive requirements placed on elite age-grade rugby union players (Palmer-Green et al., 2013) meant the authors had to administer the intervention and assess psychological variables in a 15-min period at the beginning of the training session at the start of each week. This influenced the study in three ways: (1) we could not use multi-item psychometric scales when measuring perceptions of collective efficacy, task cohesion and self-efficacy; (2) we could not examine whether changes in the measured constructs remained for an extended duration after each weekly intervention; and (3) we could not test the impact of intervention frequency on changes in the dependent variables. We recommend that future studies continue to adopt short psychometric assessments when exploring the longitudinal effects of OL interventions on efficacy and cohesion in elite team settings, but researchers should use multi-item instruments with non-elite teams to gain more detailed understanding of the multidimensional changes that may occur. Previous research using PETTLEP imagery interventions has demonstrated greater improvement in performance when interventions are administered more frequently (Wakefield & Smith, 2009, 2011). Based on the link between imagery and OL, we suggest future studies attempt to test the 'dose-response' relationship of OL interventions in sports teams. It is recommended that the frequency of OL intervention delivery is varied across an extended time-period to explore if a team's 'response' (psychological variables and performance) differs as a function of the intervention 'dose'.

From a practical perspective, the results of this investigation strongly support the employment of OL interventions in sports teams, with the potential for application to groups across other settings (e.g., military, educational, organisational). Our findings provide an empirical underpinning to video observation sessions, a popular training tool employed to enhance understanding, individual performance and team functioning in high performance groups such as elite sports teams, trauma units, and army battalions (e.g., Mackenzie, Xiao, & Horst, 2004). We recommend that high performance teams incorporate OL $_{MULTI}$ interventions to enhance efficacy beliefs and improve performance in addition to traditional training methods (e.g., practice drills). OL interventions can also be tailored for use with groups across different performance levels. For example, in grass-roots soccer, OL interventions can be used to enhance core skills such as ball control, dribbling, passing, and shooting, as well as essential group processes such as teamwork, communication, and role understanding.

The results of this novel multi-study investigation outline the importance of OL content level and support the use of OL $_{MULTI}$ interventions for increasing efficacy beliefs, task cohesion, and performance in sport teams. Due to the complex nature of sports teams, it is important to provide team members with both individual- and team-level mastery and vicarious experiences when using OL interventions to improve efficacy beliefs and performance. Future research should explore the 'dose-response' relationship of OL interventions in sports teams and continue using ecologically valid settings to explore the effectiveness of OL $_{MULTI}$ interventions for efficacy development in groups across different settings.

Author note

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References

Ashford, S., Edmunds, J., & French, D. P. (2010). What is the best way to change self-efficacy to promote lifestyle and recreational physical activity? A systematic review with meta-analysis. *British Journal of Health Psychology, 15*, 265–288. https://doi.org/10.1348/135910709X461752.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191–215.

Bandura, A. (1989). Social cognitive theory. In R. Vasta (Vol. Ed.), *Six theories of child*

development: . 6. Annals of child development (pp. 1–60). Greenwich, CT: JAI Press.
Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York: Freeman.
Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares, & T. C. Urdan (Eds.). *Self-efficacy beliefs of adolescents* (pp. 307–337). Greenwich, CT: Information Age Publishing.
Barker, J. B., & Jones, M. V. (2006). Using hypnosis, technique refinement, and self-modeling to enhance self-efficacy: A case study in cricket. *The Sport Psychologist, 20*(1), 94–110. https://doi.org/10.1123/tsp.20.1.94.
Barker, J. B., Mellalieu, S. D., McCarthy, P. J., Jones, M. V., & Moran, A. (2013). A review of single-case research in sport psychology 1997–2012: Research trends and future directions. *Journal of Applied Sport Psychology, 25*(1), 4–32. https://doi.org/10.1080/10413200.2012.709579.
Beauchamp, M. R., & Eys, M. A. (2014). Group integration interventions in exercise: Theory, practice and future directions. In M. R. Beauchamp, & M. A. Eys (Eds.). *Group dynamics in exercise and sport psychology* (pp. 164–182). New York, NY: Routledge.
Bennett, M., Bezodis, N., Shearer, D. A., Locke, D., & Kilduff, L. P. (2019). Descriptive conversion of performance indicators in rugby union. *Journal of Science and Medicine in Sport, 22*(3), 330–334.
Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa.
Bruton, A. M., Mellalieu, S. D., & Shearer, D. A. (2014). Observation interventions as a means to manipulate collective efficacy in groups. *Journal of Sport and Exercise Psychology, 36*(1), 27–39. https://doi.org/10.1123/jsep.2013-0058.
Bruton, A. M., Mellalieu, S. D., & Shearer, D. A. (2016a). Validation of a single-item stem for collective efficacy measurement in sports teams. *International Journal of Sport and Exercise Psychology, 14*(4), 383–401. https://doi.org/10.1080/1612197X.2015.1054853.
Bruton, A. M., Mellalieu, S. D., & Shearer, D. A. (2016b). Observation as a method to enhance collective efficacy: An integrative review. *Psychology of Sport and Exercise, 24*, 1–8. https://doi.org/10.1016/j.psychsport.2016.01.002.
Bruton, A. M., Mellalieu, S. D., Shearer, D., Roderique-Davies, G., & Hall, R. (2013). Performance accomplishment information as predictors of self-efficacy as a function of skill level in amateur golf. *Journal of Applied Sport Psychology, 25*(2), 197–208. https://doi.org/10.1080/10413200.2012.705802.
Callow, N., Hardy, L., & Hall, C. (2001). The effects of a motivational general-mastery imagery intervention on the sport confidence of high-level badminton players. *Research Quarterly for Exercise & Sport, 72*(4), 389–400. https://doi.org/10.1080/02701367.2001.10608975.
Carmer, S. G., & Swanson, M. R. (1973). An evaluation of ten pairwise multiple comparison procedures by Monte Carlo methods. *Journal of the American Statistical Association, 68*, 66–74.
Carron, A. V., Brawley, L. R., & Widmeyer, W. N. (2002a). *The group environment questionnaire test manual.* Morgantown, WV: Fitness Information Technology.
Carron, A. V., Bray, S. R., & Eys, M. A. (2002b). Team cohesion and team success in sport. *Journal of Sports Sciences, 20*(2), 119–126. https://doi.org/10.1080/026404102317200828.
Carron, A. V., & Hausenblas, H. A. (1998). *Group dynamics in sport*(2nd ed.). Morgantown, WV: Fitness Information Technology.
Carron, A. V., Widmeyer, W. N., & Brawley, L. R. (1985). The development of an instrument to assess cohesion in sports teams: The group environment questionnaire. *Journal of Sport Psychology, 7*, 244–266. https://doi.org/10.1123/jsp.7.3.244.
Chow, G.,M., & Feltz, D. L. (2014). Collective efficacy beliefs and sport. In M. Beauchamp, & M. Eys (Eds.). *Group dynamics in exercise and sport psychology: Contemporary themes* (pp. 221–248). New York, NY: Routledge Publishers.
Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*(2nd ed.). Hillsdale, NJ: Erlbaum.
Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155.
Cumming, J., Clark, S. E., Ste-Marie, D. M., McCullagh, P., & Hall, C. (2005). The functions of observational learning questionnaire (FOLQ). *Psychology of Sport and Exercise, 6*(5), 517–537. https://doi.org/10.1016/j.psychsport.2004.03.006.
Dunn, J. G., Bouffard, M., & Rogers, W. T. (1999). Assessing item content-relevance in sport psychology scale-construction research: Issues and recommendations. *Measurement in Physical Education and Exercise Science, 3*(1), 15–36. https://doi.org/10.1207/s15327841mpee0301_2.
Eys, M. A., Carron, A. V., Bray, S. R., & Brawley, L. R. (2007). Item wording and internal consistency of a measure of cohesion: The group environment questionnaire. *Journal of Sport & Exercise Psychology, 29*(3), 395–402. https://doi.org/10.1123/jsep.29.3.395.
Feltz, D. L., & Lirgg, C. D. (2001). Self-efficacy beliefs of athletes, teams and coaches. In R. N. Singer, H. A. Hausenblas, & C. Janelle (Eds.). *Handbook of sport psychology* (pp. 340–361). New York: John Wiley & Sons.
Field, A. (2018). *Discovering statistics using IBM SPSS statistics*(5th ed.). London: Sage.
Fransen, K., Mertens, N., Feltz, D., & Boen, F. (2017). "Yes, we can!" Review on team confidence in sports. *Current Opinion in Psychology, 16*, 98–103. https://doi.org/10.1016/j.copsyc.2017.04.024.
Gage, N. A., & Lewis, T. J. (2013). Analysis of effect for single-case design research. *Journal of Applied Sport Psychology, 25*(1), 46–60. https://doi.org/10.1080/10413200.2012.660673.
Kozub, S. A., & McDonnell, J. F. (2000). Exploring the relationship between cohesion and collective efficacy in rugby teams. *Journal of Sport Behavior, 23*, 120–129.
Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2010). Single-case designs technical documentation. June Retrieved from What Works Clearinghouse website: http://ies.ed.gov/ncee/wwc/pdf/wwc_scd.pdf.
Mackenzie, C. F., Xiao, Y., & Horst, R. (2004). Video task analysis in high performance teams. *Cognition, Technology & Work, 6*(3), 139–147. https://doi.org/10.1007/s10111-004-0155-1.
Magyar, M. T., Feltz, D. L., & Simpson, I. P. (2004). Individual and crew-level determinants of collective efficacy in rowing. *Journal of Sport & Exercise Psychology, 26*, 136–153. https://doi.org/10.1123/jsep.26.1.136.
Mills, K. D., Munroe, K. J., & Hall, C. R. (2000). The relationship between imagery and self-efficacy in competitive athletes. *Imagination, Cognition and Personality, 20*(1), 33–39. https://doi.org/10.2190/FC65-AP4T-E94J-5W7P.
Morgan, P. B., Fletcher, D., & Sarkar, M. (2013). Defining and characterizing team resilience in elite sport. *Psychology of Sport and Exercise, 14*(4), 549–559. https://doi.org/10.1016/j.psychsport.2013.01.004.
Munroe-Chandler, K. J., & Hall, C. R. (2004). Enhancing the collective efficacy of a soccer team through motivational general-mastery imagery. *Imagination, Cognition and Personality, 24*(1), 51–67.
Munroe-Chandler, K., Hall, C., & Fishburne, G. (2008). Playing with confidence: The relationship between imagery use and self-confidence and self-efficacy in youth soccer players. *Journal of Sports Sciences, 26*(14), 1539–1546. https://doi.org/10.1080/02640410802315419.
Myers, N. D., Feltz, D. L., & Short, S. E. (2004). Collective efficacy and team performance: A longitudinal study of collegiate football teams. *Group Dynamics: Theory, Research, and Practice, 8*, 126–138. https://doi.org/10.1037/1089-2699.8.2.126.
Page, J., & Thelwell, R. (2013). The value of social validation in single-case methods in sport and exercise psychology. *Journal of Applied Sport Psychology, 25*(1), 61–71. https://doi.org/10.1080/10413200.2012.663859.
Palmer-Green, D., Stokes, K., Fuller, C., England, M., Kemp, S., & Trewartha, G. (2013). Match injuries in English youth academy and schools rugby union: An epidemiological study. *The American Journal of Sports Medicine, 41*(4), 749–755. https://doi.org/10.1177/0363546512473818.
Paskevich, D. M., Brawley, L. R., Dorsch, K. D., & Widmeyer, W. N. (1999). Relationship between collective efficacy and team cohesion: Conceptual and measurement issues. *Group Dynamics: Theory, Research, and Practice, 3*(3), 210–222.
Patton, M. Q. (2002). Two decades of developments in qualitative inquiry: A personal, experiential perspective. *Qualitative Social Work, 1*(3), 261–283. https://doi.org/10.1177/1473325002001003636.
Ram, N., & McCullagh, P. (2003). Self-modeling: Influence on psychological responses and physical performance. *The Sport Psychologist, 17*(2), 220–241. https://doi.org/10.1123/tsp.17.2.220.
Rees, T., Hardy, L., & Ingledew, D. K. (2000). Performance assessment in sport: Formulation, justification, and confirmatory factor analysis of a measurement instrument for tennis performance. *Journal of Applied Sport Psychology, 12*(2), 203–218. https://doi.org/10.1080/10413200008404223.
Robins, R. W., Hendin, H. M., & Trzesniewski, K. H. (2001). Measuring global self-esteem: Construct validation of a single item measure and the rosenberg self-esteem scale. *Personality and Social Psychology Bulletin, 27*, 151–161. https://doi.org/10.1177/0146167201272002.
Shearer, D., Mellalieu, S. D., Shearer, C., & Roderique-Davies, G. (2009). The effects of a video-aided imagery intervention upon collective efficacy in an international paralympic wheelchair basketball team. *Journal of Imagery Research in Sport and Physical Activity, 4*(1), 2. https://doi.org/10.2202/1932-0191.1039.
Short, S. E., Sullivan, P., & Feltz, D. L. (2005). Development and preliminary validation of the collective efficacy questionnaire for sports. *Measurement in Physical Education and Exercise Science, 9*(3), 181–202. https://doi.org/10.1207/s15327841mpee0903_3.
Ste-Marie, D. M., Law, B., Rymal, A. M., O, J., McCullagh, P., & Hall, C. (2012). Observation interventions for motor skill learning and performance: An applied model for the use of observation. *International Review of Sport and Exercise Psychology, 5*, 145–176. https://doi.org/10.1080/1750984X.2012.665076.
Turner, M., & Barker, J. B. (2013). Examining the efficacy of rational-emotive behavior therapy (REBT) on irrational beliefs and anxiety in elite youth cricketers. *Journal of Applied Sport Psychology, 25*(1), 131–147. https://doi.org/10.1080/10413200.2011.574311.
Wakefield, C. J., & Smith, D. (2009). Impact of differing frequencies of PETTLEP imagery on netball shooting performance. *Journal of Imagery Research in Sport and Physical Activity, 4*(1), 1–12. https://doi.org/10.2202/1932-0191.1043.
Wakefield, C., & Smith, D. (2011). From strength to strength: A single-case design study of PETTLEP imagery frequency. *The Sport Psychologist, 25*(3), 305–320. https://doi.org/10.1123/tsp.25.3.305.
Wesch, N. N., Law, B., & Hall, C. R. (2007). The use of observational learning by athletes. *Journal of Sport Behavior, 30*(2), 219–231.