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4 Observation Interventions as a Means to Manipulate Collective Efficacy in Groups

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7 Adam M. Bruton and Stephen D. Mellalieu

8 Swansea University, United Kingdom

9 David A. Shearer

10 University of Glamorgan, United Kingdom

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13 Author Note

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15 Adam Bruton, Department of Sport and Exercise Science, College of Engineering, Swansea

16 University; Stephen Mellalieu, Department of Sport and Exercise Science, College of

17 Engineering, Swansea University; David Shearer, School of Psychology, University of

18 Glamorgan.

19 Correspondence concerning this article should be addressed to Adam Bruton,

20 Department of Sport and Exercise Science, College of Engineering, Swansea University,

21 Wales, UK, SA2 8PP. E-mail: 487425@swansea.ac.uk

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### 1                   **Observation as a Means to Manipulate Collective Efficacy in Groups**

2   Bandura's (1977) self-efficacy theory was developed within the framework of social  
3   cognitive theory and was first introduced to explain and adapt human behavior. Bandura  
4   (1997) defined self-efficacy as "beliefs in one's capabilities to organise and execute the  
5   courses of action required to produce given attainments" (p.3). Bandura (1982, 1997) also  
6   acknowledged that humans often work together towards collective objectives within groups  
7   or teams and proposed that groups have collective efficacy beliefs regarding their functional  
8   abilities for specific tasks. Bandura (1997) defined collective efficacy as "a group's shared  
9   belief in its conjoint capability to organize and execute the courses of action required to  
10   produce given levels of attainment" (p. 477).

11           Collective efficacy is important for group performance because it influences a group's  
12   task choice, effort expenditure, persistence in the face of failure, and resistance to  
13   discouragement (Bandura, 1997). A positive relationship between collective efficacy and  
14   sporting performance has been reported in both laboratory (Greenlees, Graydon, & Maynard,  
15   1999, 2000; Hodges & Carron, 1992) and field settings (Feltz & Lirgg, 1998; Myers, Feltz, &  
16   Short, 2004; Myers, Payment, & Feltz, 2004). For example, Feltz and Lirgg's (1998) season-  
17   long investigation of intercollegiate hockey identified collective efficacy as the strongest  
18   predictor of team performance. Specifically, previous performance predicted collective  
19   efficacy beliefs, which in turn predicted team performance. The reciprocal relationship  
20   between collective efficacy and group performance has subsequently been supported across a  
21   variety of sports including: American football (Myers, Feltz, et al., 2004), basketball  
22   (Watson, Chemers, & Preiser, 2001), and ice hockey (Myers, Payment, et al., 2004).  
23   Collective efficacy is also positively related to other psychological constructs important  
24   towards performance at an individual and group level, including self-efficacy (e.g., Magyar,  
25   Feltz, & Simpson, 2004) and group cohesion (e.g., Kozub & McDonnell, 2000). Indeed,

1 there is increasing evidence to suggest that collective efficacy has a positive effect upon  
2 group performance in organisational, sport, education, nursing, and military settings (see e.g.,  
3 Bandura, 1993; George & Feltz, 1995; Gibson, 1999; Goddard, Hoy, & Hoy, 2004; Zaccaro,  
4 Blair, Peterson, & Zazanis, 1995).

5         The close association between self-efficacy and collective efficacy has led researchers  
6 to suggest that the two constructs share the same antecedents (enactive mastery experiences,  
7 vicarious experience, verbal persuasion, and physiological/affective states) with the addition  
8 of leadership, cohesion and group size specific to collective efficacy (cf. Bandura, 1997;  
9 Carron & Hausenblas, 1998). Research has since indicated that mastery experiences are the  
10 strongest source of self-efficacy information (for a full review see Short & Ross-Stewart,  
11 2009) and are important towards the development of collective efficacy perceptions (e.g.,  
12 Goddard, 2001). Bandura also outlined the importance of vicarious experiences when  
13 developing efficacy beliefs, a position that has subsequently received empirical support (e.g.,  
14 Gorrell & Capron, 1990; Hagen, Gutkin, Wilson, & Oats, 1998).

15         Although the current study does not measure constructs at the neural activation  
16 systems level, a complete understanding of psychological constructs cannot be achieved  
17 through abstract constructions of behavior alone. To fully understand psychological  
18 constructs we must integrate our understanding of both brain and behavior (cf. Keil, Holmes,  
19 Bennett, Davids, & Smith, 2000). In this sense, understanding of the development of group-  
20 related constructs such as collective efficacy can be enhanced by recent neuroscience  
21 literature. Specifically, evidence within cognitive neuroscience shows that when we observe  
22 others actions and emotions, our brain activates as though we were experiencing those actions  
23 and emotions ourselves (for a review see Gatti et al., 2012). This physical mechanism allows  
24 us to empathise with others and provides an answer for ‘theory of mind’. Practically, this

1 suggests that observing teammates behaviors and emotions is the physical process by which  
2 collective efficacy perceptions are formed.

3         To date, limited attention has been given to the potential of individual interventions  
4 for manipulating psychological variables that contribute to group functioning in sport, and in  
5 particular, collective efficacy beliefs. Studies have reported that both goal-setting (Gibson,  
6 2001) and verbal self-guidance (Brown, 2003) hold a positive relationship with collective  
7 efficacy, yet neither method has been employed extensively. Motivational general-mastery  
8 imagery (MG-M), which requires the individual to image being mentally tough and confident  
9 in all circumstances, has been acknowledged as an effective method for the manipulation of  
10 collective efficacy beliefs (e.g., Munroe-Chandler & Hall, 2004; Shearer, Mellalieu, Shearer,  
11 & Roderique-Davies, 2009). Research has identified imagery and observation as similar yet  
12 distinct cognitive processes, acknowledging the absence/presence of an external stimulus for  
13 the individual as a clear difference between the two (e.g., Cumming, Clark, Ste-Marie,  
14 McCullagh, & Hall, 2005; McCullagh & Weiss, 2001). However, given the proposed  
15 observational basis of collective efficacy perceptions, observation interventions present a  
16 viable alternative to imagery. Indeed, live observation provides a more accurate neural  
17 representation of action execution in comparison to imagery (Holmes & Calmels, 2008)  
18 suggesting it may be more effective at influencing collective efficacy. Social comparison and  
19 self-modeling techniques are suggested to provide individuals with efficacy information  
20 (Maddux, 1995; Singleton & Feltz, 1999). Observation of a group task/action includes both  
21 the modeling of oneself and others' actions and behaviors, and is thereby recognised as an  
22 antecedent for efficacy beliefs in the form of vicarious experiences (Shearer, Holmes, &  
23 Mellalieu, 2009). Specifically, Feltz, Short, and Sullivan (2008) outlined the potential for  
24 modeling to influence efficacy beliefs by providing the observer with instructional  
25 information, and by showing that a task can be learned and completed successfully.

1 Moreover, modeling has the capacity to provide an individual with performance  
2 accomplishment information (Feltz, Landers, & Raeder, 1979), a source from which  
3 collective efficacy perceptions can be formed.

4 Further support for the potential role of observation interventions in the development  
5 of collective efficacy beliefs can also be found within the cognitive neuroscience literature.  
6 Considerable evidence shows that similar neural pathways are accessed for both live  
7 observation and movement execution (e.g., Cross, Hamilton, & Grafton, 2006; Grezes &  
8 Decety, 2001; Uddin, Iacoboni, Lange, & Keenan, 2007), with the shared structures  
9 extending beyond motoric regions to the emotional limbic system (Carr, Iacoboni, Dubeau,  
10 Mazziotta, & Lenzi, 2003). These findings suggest that an observation intervention can  
11 provide an individual with similar information for actions, behaviors and emotions to that of  
12 actual execution. Indeed, the techniques of self-observation and modeling have received  
13 considerable attention as interventions for various human performance activities (e.g.,  
14 Baudry, Leroy, Seifert, & Chollet, 2005; Cross, Kraemer, Hamilton, Kelley, & Grafton,  
15 2009; Feltz, Short, & Singleton, 2008). The majority of these studies have reported  
16 performance benefits in skill acquisition as a result of observation, and while observation has  
17 yet to be considered as an intervention for collective efficacy, studies have reported increased  
18 self-efficacy as a result of self-modeling (e.g., Clarke & Ste-Marie, 2007; Weiss, McCullagh,  
19 Smith, & Berlant, 1998; Starek & McCullagh, 1999).

20 A salient factor to consider when studying collective efficacy is the level of analysis  
21 adopted. Although collective efficacy is a group's shared belief, it still reflects an  
22 individual's perceptions of the team's capabilities and may therefore be considered at both  
23 the individual and group level of analysis (Bandura, 1997). Collective efficacy has been  
24 examined both as an individual (e.g., Heuze, Sarrazin, Masiero, Raimbault, & Thomas, 2006)  
25 and group belief (e.g., Gibson, 1999), together with the use of both levels of analysis

1 simultaneously (Lindsley, Brass, & Thomas, 1995; Moritz & Watson, 1998). Bandura  
2 advocated that each team member's belief in the team's overall capabilities should be  
3 considered, and these individual measures aggregated to the team level. While aggregated  
4 collective efficacy details a group's overall beliefs, it does not consider the differences that  
5 may occur between individual perceptions within a group (Shearer, Holmes, et al., 2009).  
6 Therefore, it would seem sensible that the individual-level analysis would have the greatest  
7 sensitivity to measure small changes within a group (e.g., identifying team members who  
8 have low collective efficacy). This suggests that an individual-level approach is appropriate  
9 when considering the effects of an individual intervention upon collective efficacy  
10 perceptions.

11         In consideration of both observation as an antecedent of collective efficacy (i.e.,  
12 vicarious experience), and the neural mechanisms of social cognition, observation  
13 interventions have the potential to influence collective efficacy perceptions because they  
14 represent the actual mechanisms by which collective efficacy is formed. Collective efficacy  
15 perceptions are formed by perceiving what others feel, suggesting that video footage of  
16 group-based performance and interactions can be used to influence such beliefs.  
17 Consequently, this investigation aimed to examine observation interventions as a method for  
18 manipulating individual collective efficacy perceptions. In study one we explored the effect  
19 of observation content upon collective efficacy beliefs. While observation content has yet to  
20 be examined, imagery content (positive/negative) has been shown to influence several  
21 correlates of collective efficacy, including: motor skill performance, sport performance, and  
22 self-efficacy (e.g., Short et al., 2002; Taylor & Shaw, 2002; Woolfolk, Parrish, & Murphy,  
23 1985). Based upon potential provision of both vicarious and mastery information through  
24 observation, we hypothesised that changes in individual collective efficacy beliefs would be  
25 contingent with the content of the observation intervention. Specifically, when considering a

1 lab-based obstacle course task, individuals allocated to a negative observation condition  
2 would experience decreased efficacy, allocation to the neutral condition would result in no  
3 change, and allocation to a positive condition would cause an increase in efficacy.

4 In study two we explored the effects of observation content familiarity upon  
5 individual collective efficacy beliefs in a field-based setting (that of a sports team). As neural  
6 activation is similar for action execution and observation of familiar action compared to  
7 observation of non-familiar action (see Calvo-Merino, Glaser, Grezes, Passingham, &  
8 Haggard, 2005, 2006) we predicted that a change in collective efficacy beliefs would be  
9 dependent upon familiarity with the content of the observation intervention. Given that  
10 athletes often train and compete in groups, sport provides an ideal environment to examine  
11 this influence. Specifically, observing positive footage of one's own team performing  
12 familiar activities was predicted to increase collective efficacy, whilst observing positive  
13 footage of an unknown team performing unfamiliar activities was suggested to have no  
14 impact upon efficacy beliefs.

## 15 Study 1

### 16 Method

#### 17 Participants

18 An opportunity sample of one hundred and thirty three undergraduate students ( $M_{\text{age}} =$   
19 20.63 years,  $SD_{\text{age}} = 1.84$  years) from a higher education institution in South Wales, UK  
20 participated in this study. Each participant held membership with an interactive sports team,  
21 ensuring a degree of familiarity with teamwork, physical activity, and group dynamics (i.e.,  
22 collective beliefs). The five most popular and successful team sports at the institution of the  
23 researchers were used for this study (rugby union, soccer, field hockey, basketball, and  
24 netball). Consistent with University ethical guidelines, participants provided informed  
25 written consent prior to participation.



## 1 Measures

2           **Collective efficacy.** The Collective Efficacy Questionnaire for Sport (CEQS; Short,  
3 Sullivan, & Feltz, 2005) was employed to measure individual-level perceptions of collective  
4 efficacy. The CEQS is a 20-item questionnaire consisting of five factors: effort, persistence,  
5 ability, preparation, and unity. Ratings were made on a 10-point rating scale ranging from 0  
6 (not at all confident) to 9 (completely confident). Construct validation of the measure with  
7 college-age student-athletes (Short et al.) using confirmatory factor analysis has indicated that  
8 the model is robust (CFI = .92, NNFI= .90, SRMR = .06), the exception being the error of  
9 approximation statistic (RMSEA = .10), which represents a mediocre fit (see Browne &  
10 Cudeck, 1993). Short et al. also reported strong internal reliability ( $\alpha$  range = .85 - .96), with  
11 similar findings evident for this study ( $\alpha$  = .91).

## 12 Procedure

13           The experiment was fifteen-days in duration with participants required to attend two  
14 sessions on day one and day fifteen respectively. In order to maximise motivation,  
15 participants were told that they were to participate in a UK-wide experiment on teamwork,  
16 competing in a task requiring balance, co-ordination and team work (“egg and spoon” race  
17 combined with a team obstacle course) similar to that used by Shearer, Mellalieu, Thomson,  
18 and Shearer (2008). The obstacle course consisted of thirteen cones, two upturned benches,  
19 one speed ladder, three hula-hoops, five step boxes, three badminton posts, two badminton  
20 nets, and three chairs, spanning the dimensions of a basketball court and completed in an  
21 anti-clockwise direction (Figure 1). Teams were informed of the competitive nature of the  
22 experiment and thus instructed to perform to the best of their abilities. Teams were led to  
23 believe that they were participating as representatives of their University and that several  
24 teams had already taken part in the experiment from other UK-based universities. This was

1 demonstrated by showing the participants a false datasheet, with a large sample size and  
2 names of universities for all over the UK.

3 To begin the experiment, participants were placed into teams of three with people  
4 whom they were already familiar (i.e., not strangers) and homogeneous in terms of both  
5 gender and height. Each team was randomly allocated to one of three treatment groups (i.e.,  
6 positive,  $n = 16$ ; neutral,  $n = 14$ ; or negative,  $n = 15$ ) remaining blind to this allocation. Each  
7 of the teams were instructed that they should not discuss performance results with  
8 participants from opposing teams and if they were found to have done so the team would be  
9 withdrawn from the competition.

10 Once formed, each team had three timed practice trials for the obstacle course task.  
11 The task was setup in a relay format, requiring each of the three team members to complete  
12 the obstacle course in the fastest time possible. Once each participant had completed the  
13 obstacle course they would transfer the ball to the next participant (interactive component),  
14 subsequently the ball was transferred from the first participant to the second, and from the  
15 second to the third until all three had completed the course. Five second time penalties were  
16 added to each team's overall time for any mistakes they made while completing the course.  
17 For example, time penalties were given for touching the golf ball with anything other than the  
18 spoon (even during exchange from teammate to teammate), dropping the golf ball, putting a  
19 foot down while crossing the benches, or touching/moving the nets. Each section of the  
20 course was adjudicated by a member of the research team. The team was given five minutes  
21 rest, the procedure was then completed two more times. Upon completion of the third trial,  
22 the team was provided with a false average time for the three trials, and this was identified as  
23 a mediocre time lying in the middle tenth of the fictitious database provided for all  
24 participants across other UK universities. Participants were informed that all forms of

1 practice were prohibited and asked to return in fourteen days time to the laboratory, prior to  
2 participation in a competitive trial to be used for the UK wide experiment.

3 All practice sessions were video recorded for the purpose of developing team-specific  
4 video interventions. This fourteen-day break period was required for the production of the  
5 video interventions, during this period all video footage was edited, formulating multiple  
6 video clips for each of the teams ( $M_{\text{clips}} = 25$  per team). This footage consisted of actual  
7 performance, team interactions during performance, and reactions to performance results.  
8 The recordings focused on positive video footage (i.e., a celebratory reaction to success, a  
9 performer being pleased with performance, a successful completion of one of the obstacles),  
10 and negative video footage (i.e., disappointed reactions to failure, dropping the ball, a mistake  
11 being made). The video interventions lasted twenty-five seconds, combining five separate  
12 five-second video clips. Each intervention included five different obstacles and showed  
13 footage for each of the three performers. The interventions were condition-based, meaning  
14 groups allocated to the positive condition viewed positive video clips and groups allocated to  
15 the negative condition viewed negative video clips collected from their respective practice  
16 performances. For the neutral condition, to take account of the social cognitive nature of  
17 collective efficacy, a standardised video intervention was adopted based on the layout of the  
18 obstacle course with no participants appearing in the footage.

19 When the participants returned to the laboratory fourteen days later, the competitive  
20 trials were fully explained and each team was reminded of the task requirements and their  
21 mediocre results in the practice trials. Each of the teams completed the CEQS for the first  
22 time (pre-intervention), after which they were informed that they would take part in the  
23 competitive trial in thirty minutes. Upon completion of this first measure, their respective  
24 intervention strategies were administered. Once the intervention was complete, collective

1 efficacy responses were recorded for the second time (post-intervention) using the CEQS and  
2 the participants debriefed about the real purpose of the experiment.

### 3 **Data Analysis**

4 Data was screened for normality and homogeneity of variance using the Shapiro-Wilk  
5 test and Levene's test respectively. A mixed 3 x 2 (*condition* x *time*) model ANOVA was  
6 used to examine the data for main effects and interactions of the independent variables.  
7 Specifically, *condition* (*positive/neutral/negative*) was used as the between-subjects factor,  
8 while *time* (*pre-intervention/post-intervention*) was used as the within-subjects factor.  
9 Simple planned contrasts were used to make comparisons between time (first) and condition  
10 (last). In addition, Gabriel's procedure was used for post-hoc analysis as this test is accurate  
11 when sample sizes are unequal (Field, 2009). All statistical procedures were conducted using  
12 SPSS for Windows, version 19; utilising a minimum significance level of  $p = 0.05$ .

## 13 **Results**

### 14 **Data Screening**

15 CEQS data for each group was screened for the assumptions of normality at both pre-  
16 and post-intervention. The Shapiro-Wilk test identified collective efficacy scores for the  
17 positive ( $D(48) = .98-.99, p > .05$ ), neutral ( $D(41) = .96-.97, p > .05$ ), and negative groups  
18 ( $D(44) = .96-.98, p > .05$ ), as normal at both time points. The Levene's test reported equal  
19 variance in collective efficacy scores for all conditions both pre-intervention ( $F(2, 130) =$   
20  $0.38, p > .05$ ), and post-intervention ( $F(2, 130) = 5.20, p > .05$ ).

### 21 **Collective Efficacy Scores**

22 An alpha level of .05 was used for the initial analyses. The mixed 3 x 2 ANOVA  
23 results for the overall CEQS scores suggested a non-significant main effect within groups for  
24 time, between the pre- and post-intervention measures ( $F(1,130) = .31, p > .05, r = .05$ ), a  
25 significant main effect between groups for condition ( $F(2,130) = 16.04, p < .05, r = .33$ ) and

1 a significant interaction between time and condition ( $F(2,130) = 47.99, p < .05, r = .52$ )<sup>1</sup>.  
2 Closer inspection of the score profiles indicated the nature of the difference between the three  
3 conditions (see Figure 2). Specifically, pre-intervention collective efficacy scores (Table 1)  
4 indicated little difference between the positive ( $M = 6.51, SD = 0.81$ ), neutral ( $M = 6.49, SD$   
5  $= 0.80$ ) and negative conditions ( $M = 6.40, SD = 0.78$ ). Post-hoc analysis using Gabriel's  
6 procedure showed post-intervention differences in collective efficacy between the positive  
7 and negative conditions ( $M_{diff} = .86, SE = .16, p < .05$ ) and the neutral and negative  
8 conditions ( $M_{diff} = .72, SE = .17, p < .05$ ), however, no differences were observed between  
9 the positive and neutral conditions ( $M_{diff} = .15, SE = .16, p > .05$ ). Specifically, an increase  
10 was observed in mean scores for both the positive ( $M = 7.06, SD = 0.71$ ) and neutral  
11 conditions ( $M = 6.78, SD = 0.92$ ) with a decrease evident for the negative condition ( $M =$   
12  $5.44, SD = 1.12$ ).

## 13 Study 2

### 14 Method

#### 15 Participants

16 Participants ( $n = 36$ ) were recruited via opportunity sampling from a university men's  
17 basketball squad ( $n = 18, M_{age} = 21.73$  years,  $SD_{age} = 1.51$  years) and other interactive sports  
18 teams ( $n = 18, M_{age} = 21.94$  years,  $SD_{age} = 1.76$  years). Basketball players competed for  
19 either the men's 1<sup>st</sup> team or 2<sup>nd</sup> team in British Universities Western Divisions 1A and 2B,  
20 respectively. Interactive team sports players were recruited from other popular sports at the  
21 same institution (rugby union, soccer, and field hockey). Basketball players were recruited  
22 for participation in this study because the controlled environment for competitive fixtures  
23 allowed for the collection of detailed video footage. Participants from other interactive teams

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<sup>1</sup> An identical pattern of findings were derived when the separate dimensions of CE were operationalized. The results of the ANOVAs are available from the author upon request.

1 were recruited because of their understanding of competitive sport, and their relative lack of  
2 understanding of basketball performance. Together, these two sub-samples provided an  
3 opportunity to examine the effect of content familiarity upon collective efficacy responses to  
4 positively oriented video footage of competitive basketball. Consistent with University  
5 ethical guidelines, each of the participants provided informed written consent prior to  
6 participation.

### 7 **Measures**

8 **Collective efficacy.** Remaining consistent with the methods from study one,  
9 collective efficacy was measured using the CEQS (Short et al., 2005). Cronbach alpha  
10 coefficients indicated adequate internal reliability for the sample ( $\alpha = .91$ ).

### 11 **Procedure**

12 Following recruitment of participants, informed consent was obtained for each  
13 individual. Video footage of the basketball teams participating in the study was collected  
14 over an 8-week period. During these dates the men's 1<sup>st</sup> team took part in eleven competitive  
15 matches and the 2<sup>nd</sup> team took part in six competitive matches, ranging from university  
16 league and cup to regional men's fixtures. Footage consisted of actual performance (on  
17 court), team interactions during performance (i.e., communication, team drills), and reactions  
18 to performance results (both on and off court, i.e., successful baskets/plays). Recordings  
19 focused on positive video footage (i.e., a celebratory reaction to success, a performer being  
20 pleased with performance, a successful completion of an action, a significant performance  
21 result). All video footage was edited using CyberLink PowerDirector 10 Ultra, producing  
22 sixty five and seventy two video clips for the men's first and second teams respectively. In  
23 coordination with the University basketball coach, criterion was set for the development of  
24 both team-specific observation interventions. Specifically, all team members had to play an  
25 active role in at least two of the video clips, and all aspects of overall basketball performance

1 had to be accounted for within the intervention as a whole. Subsequently, seven separate  
2 video clips lasting between ten and fifteen seconds were selected for both basketball teams'  
3 *familiar* observation intervention, lasting approximately ninety seconds in total.  
4 Accordingly, the non-basketball participants were randomly allocated either the 1<sup>st</sup> ( $n = 9$ ) or  
5 2<sup>nd</sup> ( $n = 9$ ) basketball team intervention for their *unfamiliar* observation intervention.

6 Data collection comprised a three-step process that each participant completed  
7 individually. To begin, participants completed the CEQS (pre-intervention), after which the  
8 intervention was administered. Once the observation intervention was watched in full,  
9 collective efficacy beliefs were once again collected using the CEQS (post-intervention) and  
10 detailed information regarding the true nature of the study was revealed.

### 11 **Data Analysis**

12 Data was screened for normality and homogeneity of variance using the Shapiro-Wilk  
13 test and Levene's test respectively. A mixed 2 x 2 (*familiarity* x *time*) model ANOVA was  
14 used to examine the data for main effects and interactions of the independent variables for the  
15 collective efficacy scores. Specifically, *familiarity* (*familiar/unfamiliar*) was used as the  
16 between-subjects factor, while *time* (*pre-intervention/post-intervention*) was used as the  
17 within-subjects factor. All statistical procedures were conducted using SPSS for Windows,  
18 version 19, utilising a minimum significance level of  $p = 0.05$ .

## 19 **Results**

### 20 **Data Screening**

21 CEQS data for each group was screened for the assumptions of normality at both pre-  
22 and post-intervention. The Shapiro-Wilk test indicated that collective efficacy data for the  
23 familiar ( $D(18) = .90-.91, p > .05$ ) and unfamiliar groups ( $D(18) = .94-.94, p > .05$ ) was  
24 normal at both time points. The Levene's test reported equal variance in collective efficacy

1 scores for both groups pre-intervention ( $F(1, 34) = .49, p > .05$ ) and post-intervention ( $F(1,$   
2  $34) = .02, p > .05$ ).

### 3 **Collective Efficacy Scores**

4 An alpha level of .05 was used for the initial analyses. The mixed 2 x 2 ANOVA  
5 results for the CEQS scores suggested a significant main effect within groups for time,  
6 between the pre-intervention and post-intervention measures ( $F(1, 34) = 46.90, p < .001, r =$   
7  $.76$ ), no main effect between groups for familiarity ( $F(1, 34) = 0.60, p > .05, r = .04$ ) and a  
8 significant interaction between time and familiarity ( $F(1, 34) = 11.72, p < .01, r = .51$ )<sup>2</sup>.  
9 Closer inspection of the score profiles indicated the nature of the difference between the  
10 groups (See Figure 3). Specifically, pre-intervention collective efficacy scores recorded  
11 using the CEQS (Table 1) identified that the familiar group had a lower mean score ( $M =$   
12  $6.16, SD = 1.08$ ) than the unfamiliar group ( $M = 6.52, SD = 0.82$ ). However, an increase was  
13 observed in post-intervention mean scores for both the familiar group ( $M = 7.03, SD = 1.02$ )  
14 and unfamiliar group ( $M = 6.81, SD = 0.87$ ), this increase was greatest for the familiar group.

### 15 **Discussion**

16 Taken together our study findings promote observation interventions as a means to  
17 manipulate individual collective beliefs in groups. The results from study one support the  
18 assumption that the content (positive, neutral, negative) of an observation intervention can be  
19 used to manipulate individual collective efficacy perceptions. The positive intervention  
20 caused an increase in collective efficacy beliefs comparable to previous findings examining  
21 positive imagery and collective efficacy (e.g., Munroe-Chandler & Hall, 2004; Shearer,  
22 Mellalieu et al., 2009). Observation of video footage with negative content resulted in  
23 decreased collective efficacy beliefs, a similar finding to that reported in the existing imagery

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<sup>2</sup> An identical pattern of findings were derived when the separate dimensions of CE were operationalized. The results of the ANOVAs are available from the author upon request.



1 literature. Specifically, negative imagery use is associated with decreased motor skill  
2 performance (Woolfolk et al., 1985), sport performance (e.g., Taylor & Shaw, 2002), and  
3 self-efficacy (Short et al., 2002), all correlates of collective efficacy. As similarities exist  
4 between imagery and observation, we would therefore expect imagery content and  
5 observation content to hold a comparable influence towards collective efficacy perceptions.

6         Observation interventions have the capacity to provide an individual with both  
7 mastery experiences and vicarious experiences. When referring to the provision of mastery  
8 experiences through observation, the direction of change in collective efficacy beliefs will  
9 ultimately depend upon the content of the observation intervention. Bandura (1997) suggests  
10 that negative mastery experiences (i.e., failures) undermine efficacy development, this effect  
11 being greatest when beliefs are yet to be firmly established, this was observed in study 1.  
12 Moreover, when considering observation as a form of vicarious experience it is logical to  
13 assume an association can exist in both a negative and positive direction. Goddard et al.  
14 (2004) suggest that when an observer is viewing an identifiable model a change in their  
15 efficacy beliefs will coincide with the nature of the model's performance. Previous research  
16 has opted to use positive imagery and observation tactics when manipulating efficacy beliefs  
17 (e.g., Dowrick, 1999; Shearer et al., 2008). However, our findings suggest that collective  
18 efficacy can be influenced in both a positive and negative direction, emphasising the  
19 importance of video content when considering an observation intervention for efficacy  
20 manipulation.

21         The results from study two partially support the assumption that content familiarity is  
22 important when considering the manipulation of collective efficacy beliefs through  
23 observation-based techniques. Individuals observing video footage of their own team  
24 performing successful actions experienced larger increases in collective efficacy beliefs to  
25 those observing video footage of an unknown team of a different sport. Support for our

1 findings exists within previous modeling literature. Specifically, self-modeling and positive  
2 self-review have received support as interventions to enhance self-efficacy (see Dowrick,  
3 1999 for a full review). Both of these observation types provide an individual with video  
4 footage of oneself performing an activity in a positive manner. As collective efficacy is  
5 considered the group equivalent to self-efficacy, and a relationship has been established  
6 between the two constructs, it seems reasonable that the largest efficacy response in our  
7 second study was found for individuals who viewed footage of their own team performing  
8 successfully. Bandura (1997, p. 94) suggests that the advantage of seeing oneself perform  
9 successfully is that it "provides clear information on how best to perform skills, and it  
10 strengthens beliefs in one's capability". Seeing oneself performing successfully potentially  
11 evokes a greater efficacy response than viewing an unknown in an identical context.

12 As collective efficacy is both rooted in and shares the antecedents of self-efficacy  
13 (Carron & Hausenblas, 1998), it is plausible that 'seeing oneself' is equally applicable to  
14 'seeing one's group'. When considering observation of one's team as an alternative to self-  
15 modeling, familiarity may have an important role in the effectiveness of this technique.  
16 Varying levels of success have been achieved in past research examining self-modeling and  
17 self-efficacy and it is suggested that model similarity is a distinguishing factor between  
18 effective and ineffective studies (see Short & Ross-Stewart, 2009 for a review). Indeed, the  
19 findings from our study indicate that model, action, and environmental similarity are all  
20 important in the manipulation of efficacy beliefs. The observation intervention is most  
21 influential when the content is familiar to the individual involved, emphasising the  
22 importance of content familiarity. However, individual collective efficacy perceptions are  
23 increased for the unfamiliar group also, suggesting that an observation intervention  
24 displaying positive group based footage may also positively influence the development of  
25 collective efficacy beliefs in those to whom the footage is unrelated. The potential for

1 emotional reward has been cited as the main reason for media consumers watching sports  
2 performance (Raney, 2006). Indeed, competitive sports fixtures are highly emotive events  
3 for those that are indirectly involved (i.e., fans/audience), often leading to changes in various  
4 emotions whilst a performance is being viewed (i.e., arousal, self-esteem, mood; see e.g.,  
5 Kerr, 1994; Wann, Brewer, & Royalty, 1999; Raney & Depalma, 2006). Use of video  
6 footage from competitive team sports performance is therefore likely to evoke an emotional  
7 response from all individuals, no matter their familiarity with the sport/team displayed. We  
8 suggest that observation of any group displaying positive ‘group’ characteristics and  
9 producing positive performance is likely to inspire an increase in individual collective  
10 efficacy beliefs. This effect is likely to be greatest when the individual is familiar to the  
11 content of the observation intervention (e.g., viewing one’s team performing in a familiar  
12 situation). Sports fandom research suggests identification as an important motive for viewing  
13 sports performance, while various studies have reported increased self-esteem and confidence  
14 when viewing a favoured team performing successfully (e.g., Hirt, Zillmann, Erickson, &  
15 Kennedy, 1992; Madrigal, 1995). Our findings also indicate that the level of identification  
16 an individual holds with a team dictates the size of emotional response. Therefore, if we  
17 consider watching positive team sports footage, we would expect the size of an emotional  
18 response (i.e., collective efficacy) to be dependent upon the individual’s level of  
19 identification (i.e., familiarity) with the team involved.

20 From a practical perspective our findings provide evidence for the use of observation  
21 interventions to increase individual-level collective efficacy beliefs for sports teams, with the  
22 potential for application to groups across other settings (e.g., military, educational,  
23 organisational). Our findings place emphasis on the need to control the content of video  
24 footage in order to ensure that an observation intervention has the desired influence upon an  
25 individual’s collective efficacy beliefs. In a sporting context, teams may employ a team-

1 specific observation intervention similar to that used in study two. For example, if a team  
2 often struggles with a certain play, video footage of them performing this successfully could  
3 be integrated within a training session, thereby increasing the team's collective efficacy  
4 beliefs and potentially leading to improved performance in this situation. Additionally, a  
5 team viewing an intervention with positive content immediately prior to competitive  
6 performance may experience an immediate increase in collective efficacy beliefs to be carried  
7 through to competition.

8         Although our findings indicate observation can be considered an effective method for  
9 collective efficacy manipulation, there are some limitations to be considered in relation to the  
10 neutral intervention adopted in study one and the population used for study two. Specifically,  
11 participants in the neutral condition in study one reported experiencing a significant increase  
12 in collective efficacy beliefs post-intervention, indicating that the content of the observation  
13 intervention used for this condition may have been unsuitable. The intervention included  
14 observation of obstacles used for the lab experiment which may have caused an individual to  
15 imagine their team's previous performances in this setting. The use of three practice trials for  
16 the obstacle course task afforded the likelihood that the participants experienced a positive  
17 performance for at least one of the obstacles displayed. Therefore, although the video  
18 intervention provided the individual with less performance accomplishment information  
19 (mastery experiences) than that of the other conditions, it's potential to evoke a positive  
20 emotional response may explain the subsequent increase in collective efficacy for the neutral  
21 condition. Future research should consider using a neutral intervention with no association to  
22 the task in hand. This may include observation of off-topic video footage, quotations from a  
23 book, or an appropriate alternative (see Betz & Schifano, 2000 for an example of an  
24 alternative neutral intervention). In study two the development of the intervention required  
25 collection of video footage for both basketball teams across several fixtures. This meant it

1 was only feasible to use two teams and subsequently our study population couldn't exceed  
2 thirty-six as to avoid any biases. Despite this small population size, the within-subject and  
3 interaction effect sizes for this study ( $>.50$ ) are classified as a large effect within previous  
4 guidelines (cf. Cohen, 1988, 1992), supporting the strength of the observation effect. If  
5 replicated, it is recommended that future research consider either using groups/teams with  
6 large populations or multiple groups/teams in order to ensure that the desired effects are  
7 attainable.

8         A further consideration in our study was the use of the CEQS measure to assess  
9 collective efficacy. Short and colleagues (2005) developed the CEQS as a domain-specific  
10 measure for use with sports teams. Whilst this allows for greater measurement consistency  
11 between collective efficacy studies in sport, this does not follow Bandura's (2006)  
12 recommendations for the development of context-specific scales that maximize concordance  
13 between the task and the measure of collective efficacy. Although the CEQS cannot achieve  
14 the same level of concordance as it measures team qualities that are common across sports, it  
15 does overcome a number of inconsistencies in how collective efficacy has been  
16 conceptualized, operationalized, and measured within previous literature (cf. Baker, 2001;  
17 Maddux, 1999). Nevertheless, the utility of context- versus domain-specific measures is an  
18 important consideration for future collective efficacy investigation in sport. In addition,  
19 consistent with Bandura's (2006) guidelines and those of other measures utilized in efficacy-  
20 based research (e.g., Coaching Efficacy Scale (CES); Feltz, Chase, Moritz, & Sullivan, 1999)  
21 this investigation used a 10-point rating scale to gauge efficacy strength for the CEQS. While  
22 this method has been employed previously, research has also questioned its effectiveness and  
23 suggested that rating scales of this size should be collapsed, as they are too large and can  
24 confuse the respondent (Myers, Wolfe, & Feltz, 2005). Indeed, Myers et al. (2005) provided  
25 evidence against the use of a 10-point scale using the CES to demonstrate that a 4-category

1 rating scale option, proved more effective. A revised form of the Coaching Efficacy Scale  
2 (CES II-HST: Myers, Feltz, Chase, Reckase, & Hancock, 2008), has also provided additional  
3 support for a 4-point rating scale over a 10-point scale. These findings suggest future  
4 investigation is warranted to specifically examine the ongoing psychometric properties of the  
5 CEQS and its utility in the measurement of collective efficacy.

6         Although our findings have shown that observation can be used to influence collective  
7 efficacy for groups partaking in physical activity and sport, researchers are yet to consider its  
8 effectiveness across other domains. There is a need to compare the effects of observation  
9 with other group dynamics interventions (e.g., traditional team building techniques) in  
10 alternate contexts (e.g., organisational) to determine the most suitable intervention for each  
11 setting. In study two we used a group equivalent of positive self-review modeling and there  
12 is a need to examine the effects of this observation type for groups across multiple domains  
13 (e.g., teaching faculties, army patrols). While our findings have shown that this observation  
14 type is an effective collective efficacy intervention, we did not consider the potential for other  
15 types of observation to influence collective efficacy. Future research should seek to compare  
16 different modeling types when considering observation interventions for individuals within  
17 groups. It is possible that other forms of observation will provide an individual/group with  
18 different sources of efficacy information to that identified for the observation method used in  
19 this research. This may include another subset of modeling known as feed-forward  
20 observation which has the capacity to either display a skill that is not yet acquired, or relay  
21 performance in a context that is yet to be addressed (Dowrick, 1999). In addition, while our  
22 investigation identified that group-based observation interventions can be used to influence  
23 collective efficacy, we did not consider its effect upon group performance. Although a large  
24 body of literature exists identifying a positive relationship between collective efficacy and  
25 group performance (see Stajkovic, Lee, & Nyberg, 2009, for a full review), and self-modeling

1 has been shown to improve task performance (e.g., Feltz, Short, & Singleton, 2008), this  
2 relationship has not been considered at a group-level and represents an apparent area of future  
3 exploration.

4         Finally, part of the conceptual basis for our investigation is that similar neural  
5 activation exists for social cognitions (e.g., collective efficacy) and both the observation and  
6 execution of action, suggesting their potential involvement with the development of social  
7 phenomena such as collective efficacy beliefs. Specifically, evidence within cognitive  
8 neuroscience research shows the mirror neuron system (MNS) is activated both when an  
9 individual performs an action, and when he/she views a similar action (for a review see Gatti  
10 et al., 2012). Although consensus has yet to be reached on a specific function for the MNS,  
11 there is agreement that this system accounts for several aspects of human social cognition, for  
12 example, action understanding and motor intention (e.g., watching team mates perform a  
13 strategy correctly). Furthermore, empirical findings suggest cortical midline structures  
14 (CMS) account for additional aspects of social cognition to those supposedly accounted for  
15 by the MNS (e.g., processing of social relationships; Iacoboni et al., 2004; Schilbach et al.,  
16 2006). Empathising with conspecifics' emotions is also proposed to activate similar brain  
17 areas that include, but extend beyond the MNS to the limbic areas (which hold a close  
18 association with emotion) via the insula (cf. Carr et al., 2003). Consequently, when  
19 individuals consider perceptions of their groups' collective efficacy, it is likely that they  
20 empathise with the content of the observed behaviors (e.g., a positive reaction to a score),  
21 engaging these neural systems. Despite these potential neuro social links, research is yet to  
22 directly measure the neural activity associated with collective efficacy development. No  
23 explanation exists for the actual mechanisms that underpin both its function and action  
24 (Shearer et al., 2009). Comprehension of the manner in which observation influences  
25 collective efficacy will allow for the measurement of neural activity in both the MNS and

1 CMS via functional magnetic resonance imaging (fMRI). Findings from study two  
2 correspond with the findings from two neuroscience studies examining MNS activity  
3 associated with observation of motor skills in dance (Calvo-merino et al., 2005, 2006).  
4 Greater MNS activity was identified when individuals observed movement patterns within  
5 their existing motor repertoire in comparison to movement patterns that were yet to be  
6 learned. As we have suggested, this motor area's strong association with both action  
7 observation and social cognition acts as grounds for its involvement within the development  
8 of collective efficacy. However, we did not measure MNS activity during observation of  
9 team mates and we can therefore only suggest that changes in collective efficacy beliefs may  
10 have occurred via the mechanism by which MNS activity was increased for Calvo-Merino's  
11 studies. In line with the recommendations by Shearer and colleagues and the findings from  
12 this investigation, it is therefore feasible that observation can be adopted as a means to  
13 examine the neurological basis of collective efficacy, comparing brain activity associated  
14 with positive footage of their own group's performance with subsequent activity associated  
15 with unfamiliar group footage and neutral footage.

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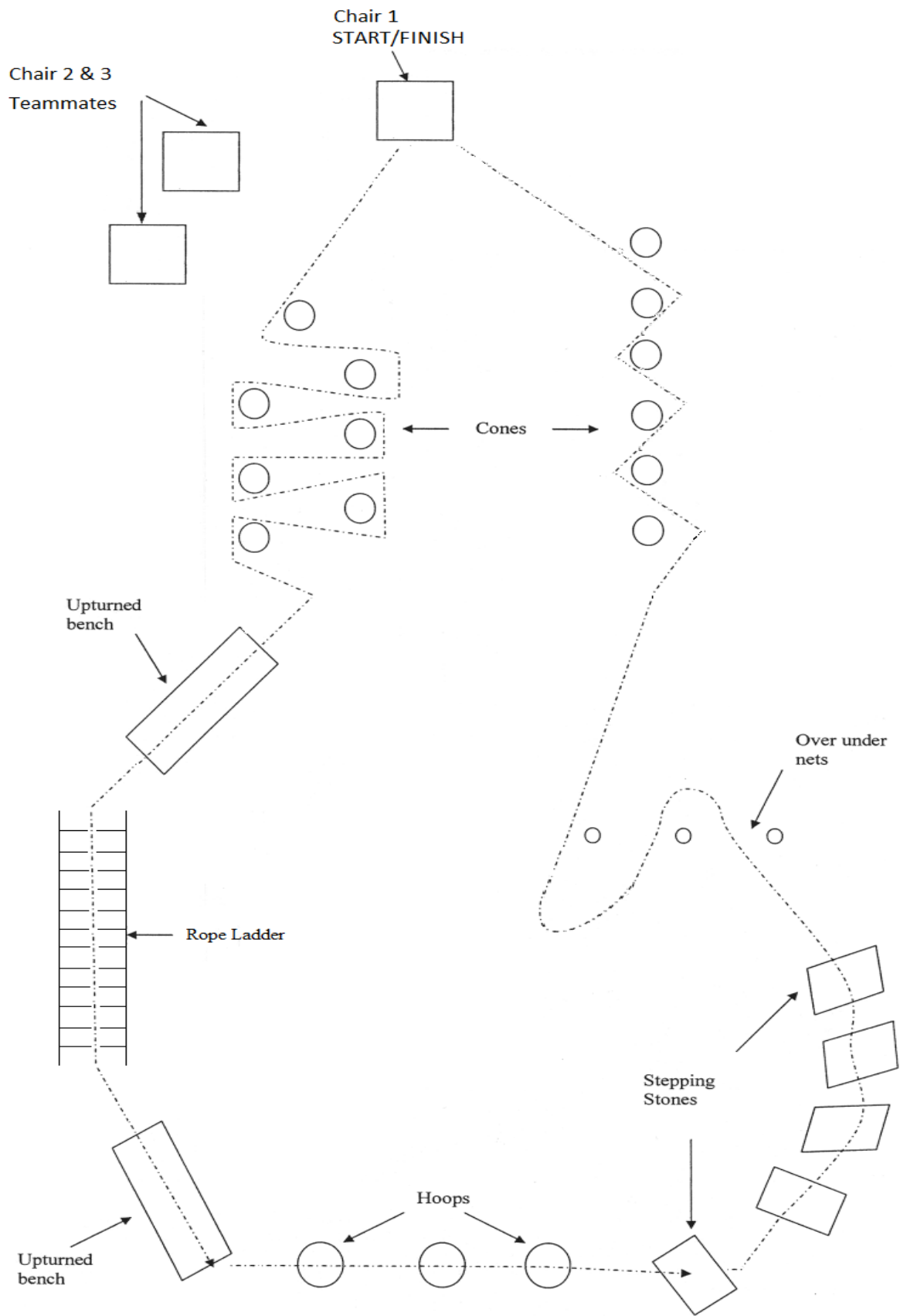


1        **Figure Captions**

2        *Figure 1.* Overhead view of the layout of the obstacle course used for the team-based task.

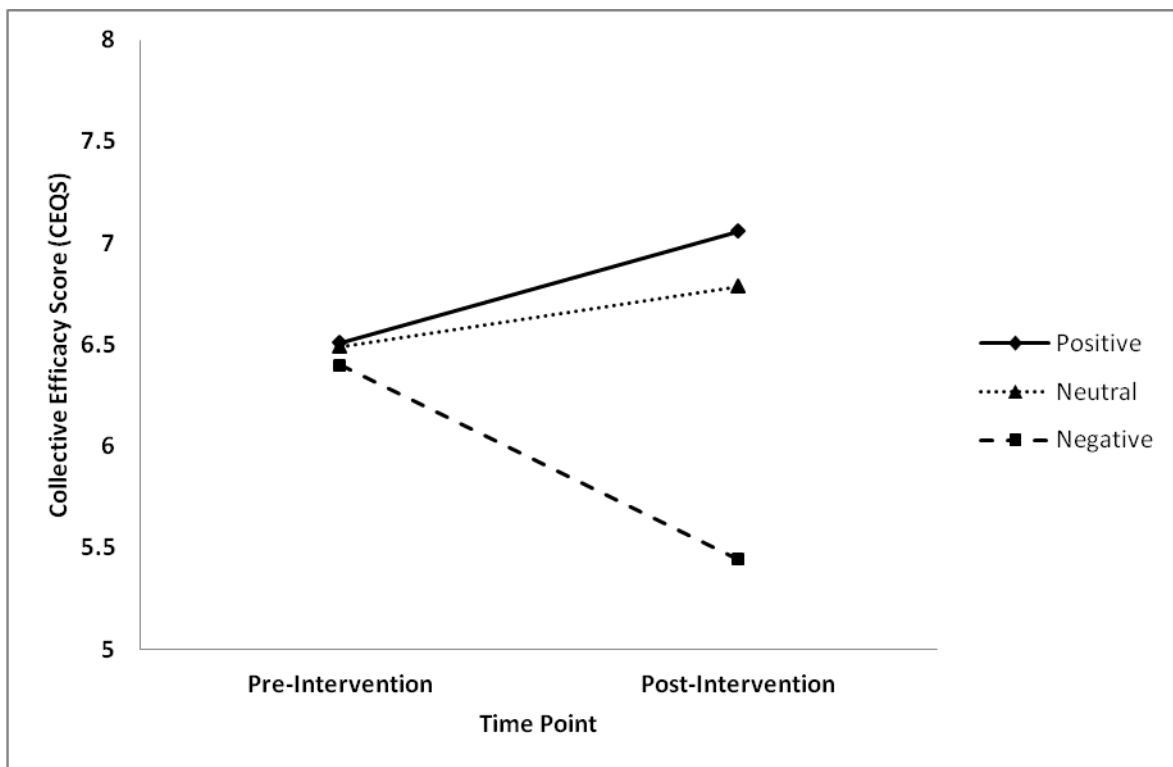
3        *Figure 2.* Intervention effect upon collective efficacy beliefs for positive, negative and  
4                neutral conditions.

5        *Figure 3.* Intervention effect upon collective efficacy beliefs for basketball and non-  
6                basketball conditions.

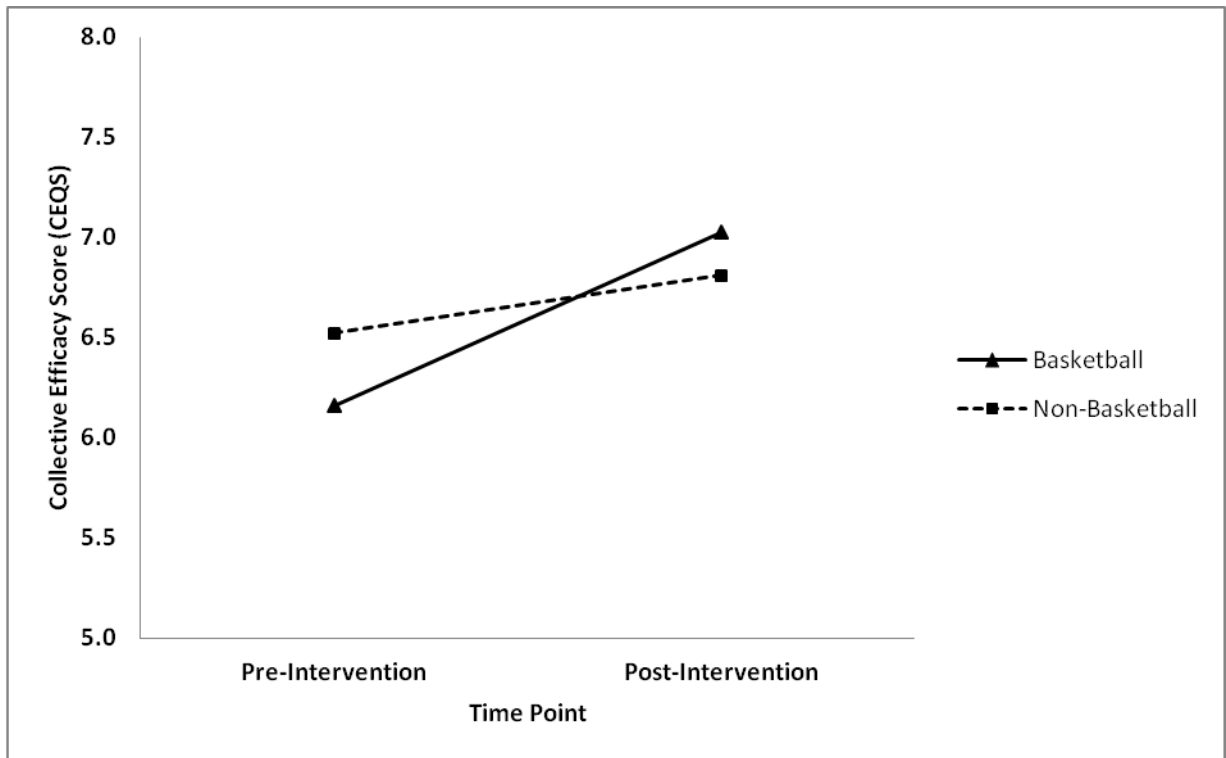


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1 Table 1

2 *Mean and Standard Deviations for Pre- and Post-intervention Collective Efficacy for*

3 *Positive, Negative, and Control Conditions*

4

Condition	Pre-intervention		Post-intervention	
	Mean	SD	Mean	SD
Positive	6.51	0.81	7.06	0.71
Neutral	6.49	0.80	6.78	0.92
Negative	6.40	0.78	5.44	1.12

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1 Table 2

2 *Mean and Standard Deviations for Pre- and Post-intervention Collective Efficacy for*

3 *Basketball and Non-basketball Groups*

4

Condition	Pre-intervention		Post-intervention	
	M	SD	M	SD
CEQS				
Basketball	6.16	1.08	7.03	1.02
Non-basketball	6.52	0.82	6.81	0.87

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