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Observation Interventions as a Means to Manipulate Collective Efficacy in Groups

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The purpose of this multistudy investigation was to examine observation as an intervention for the manipulation of individual collective efficacy beliefs. Study 1 compared the effects of positive, neutral, and negative video footage of practice trials from an obstacle course task on collective efficacy beliefs in assigned groups. The content of the observation intervention (i.e., positive, neutral, and negative video footage) significantly influenced the direction of change in collective efficacy ($p < .05$). Study 2 assessed the influence of content familiarity (own team/sport vs. unfamiliar team/sport) on individual collective efficacy perceptions when observing positive footage of competitive basketball performance. Collective efficacy significantly increased for both the familiar and unfamiliar conditions postintervention, with the largest increase for the familiar condition ($p < .05$). The studies support the use of observation as an intervention to enhance individual perceptions of collective efficacy in group-based activities. The findings suggest that observations of any group displaying positive group characteristics are likely to increase collective efficacy beliefs; however, observation of one's own team leads to the greatest increases.

Keywords: collective efficacy, observation, manipulation, content, familiarity

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

Collective efficacy is important for group performance because it influences a group's task choice, effort expenditure, persistence in the face of failure, and resistance to discouragement (Bandura, 1997). A positive relationship between collective efficacy and sporting performance has been reported in both laboratory (Greenlees, Graydon, & Maynard, 1999, 2000; Hodges & Carron, 1992) and field settings (Feltz & Lirgg, 1998; Myers, Feltz, & Short, 2004; Myers, Payment, & Feltz, 2004). For example, Feltz and Lirgg's (1998) season-long investigation of intercollegiate hockey identified collective efficacy as the strongest predictor of team performance. Specifically, previous performance predicted collective efficacy beliefs, which in turn predicted team performance. The reciprocal relationship between collective efficacy and group performance has subsequently been supported across a variety of sports, including American football (Myers, Feltz, et al., 2004), basketball (Watson, Chemers, & Preiser, 2001), and ice hockey (Myers, Payment, et al., 2004). Collective efficacy is also positively related to other psychological constructs important toward performance at an individual and group level, including self-efficacy (e.g., Magyar, Feltz, & Simpson, 2004) and group cohesion (e.g., Kozub & McDonnell, 2000). Indeed, there is increasing evidence to suggest that collective efficacy has a positive effect upon group performance in organizational, sport, education, nursing, and military settings (see e.g., Bandura, 1993; George & Feltz, 1995; Gibson, 1999; Goddard, Hoy, & Hoy, 2004; Zacarro, Blair, Peterson, & Zazanis, 1995).

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

Although the current study does not measure constructs at the neural activation systems level, a complete understanding of psychological constructs cannot be achieved through abstract constructions of behavior alone. To fully understand psychological constructs we must integrate our understanding of both brain and behavior (cf. Keil, Holmes, Bennett, Davids, & Smith, 2000). In this sense, understanding of the development of group-related constructs such as collective efficacy can be enhanced by recent neuroscience literature. Specifically, evidence within cognitive neuroscience shows that when we observe others actions and emotions, our brain activates as though we were experiencing those actions and emotions ourselves (for a review, see Gatti et al., 2013). This physical mechanism allows us to empathise with others and provides an answer for "theory of mind." Practically, this suggests that observing teammates behaviors and emotions is the physical process by which collective efficacy perceptions are formed.

To date, limited attention has been given to the potential of individual interventions for manipulating psychological variables that contribute to group functioning in sport, and in particular, collective efficacy beliefs. Studies have reported that both goal-setting (Gibson, 2001) and verbal self-guidance (Brown, 2003) hold a positive relationship with collective efficacy, yet neither method has been employed extensively. Motivational general-mastery imagery, which requires the individual to image being mentally tough and confident in all circumstances, has been acknowledged as an effective method for the manipulation of collective efficacy beliefs (e.g., Munroe-Chandler & Hall, 2004; Shearer, Mellalieu, Shearer, & Roderique-Davies, 2009). Research has identified imagery and observation as similar yet distinct cognitive processes, acknowledging the absence/presence of an external stimulus for the individual as a clear difference between the two (e.g., Cumming, Clark, Ste-Marie, McCullagh, & Hall, 2005; McCullagh & Weiss, 2001). However, given the proposed observational basis of collective efficacy perceptions, observation interventions present a viable alternative to imagery. Indeed, live observation provides a more accurate neural representation of action execution in comparison with imagery (Holmes & Calmels, 2008), suggesting it may be more effective at influencing collective efficacy. Social comparison and self-modeling techniques are suggested to provide individuals with efficacy information (Maddux, 1995; Singleton & Feltz, 1999). Observation of a group task/action includes both the modeling of oneself and others' actions and behaviors, and is thereby recognized as an antecedent for efficacy beliefs in the form of vicarious experiences (Shearer, Holmes, & Mellalieu, 2009). Specifically, Feltz, Short, and Sullivan (2008) outlined the potential for modeling to influence efficacy beliefs by providing the observer with instructional information and by showing that a task can be learned and completed successfully. Moreover, modeling has the capacity to provide an individual with performance accomplishment information (Feltz, Landers, & Raeder, 1979), a source from which collective efficacy perceptions can be formed.

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

A salient factor to consider when studying collective efficacy is the level of analysis adopted. Although collective efficacy is a group's shared belief, it still reflects an individual's perceptions of the team's capabilities and may therefore be considered at both the individual and group level of analysis (Bandura, 1997). Collective efficacy has been examined both as an individual (e.g., Heuze, Sarrazin, Masiero, Raimbault, & Thomas, 2006) and group belief (e.g., Gibson, 1999), together with the use of both levels of analysis simultaneously (Lindsley, Brass, & Thomas, 1995; Moritz & Watson, 1998). Bandura advocated that each team member's belief in the team's overall capabilities should be considered, and these individual measures aggregated to the team level. While aggregated collective efficacy details a group's overall beliefs, it does not consider the differences that may occur between individual perceptions within a group (Shearer, Holmes, et al., 2009). Therefore, it would seem sensible that the individual-level analysis would have the greatest sensitivity to measure small changes within a group (e.g., identifying team members who have low collective efficacy). This suggests that an individual-level approach is appropriate when considering the effects of an individual intervention upon collective efficacy perceptions.

In consideration of both observation as an antecedent of collective efficacy (i.e., vicarious experience), and the neural mechanisms of social cognition, observation interventions have the potential to influence collective efficacy perceptions because they represent the actual mechanisms by which collective efficacy is formed. Collective efficacy perceptions are formed by perceiving what others feel, suggesting that video footage of group-based performance and interactions can be used to influence such beliefs. Consequently, this investigation aimed to examine observation interventions as a method for manipulating individual collective efficacy perceptions. In Study 1, we explored the effect of observation content upon collective efficacy beliefs. While observation content has yet to be examined, imagery content (positive/negative) has been shown to influence several correlates of collective efficacy, including motor skill performance, sport performance, and self-efficacy (e.g., Short et al., 2002; Taylor & Shaw, 2002; Woolfolk, Parrish, & Murphy, 1985). Based upon potential provision of both vicarious and mastery information through observation, we hypothesized that changes in individual collective efficacy beliefs would be contingent with the content of the observation intervention. Specifically, when considering a laboratory-based obstacle course task, individuals allocated to a negative observation condition would experience decreased efficacy, allocation to the neutral condition would result in no change, and allocation to a positive condition would cause an increase in efficacy.

In Study 2, we explored the effects of observation content familiarity upon individual collective efficacy beliefs in a field-based setting (that of a sports team). As neural activation is similar for action execution and observation of familiar action compared with observation of nonfamiliar action (see Calvo-Merino, Glaser, Grèzes, Passingham, & Haggard, 2005, 2006) we predicted that a change in collective efficacy beliefs would be dependent upon familiarity with the content of the observation intervention. Given that athletes often train and compete in groups, sport provides an ideal environment to examine this influence. Specifically, observing positive footage of one's own team performing familiar activities was predicted to increase collective efficacy, while observing positive footage of an unknown team performing unfamiliar activities was suggested to have no impact upon efficacy beliefs.

Study 1

Method

Participants

An opportunity sample of 133 undergraduate students (M_{age} = 20.63 years, SD_{age} = 1.84 years) from a higher education institution in South Wales, United Kingdom, participated in this study. Each participant held membership with an interactive sports team, ensuring a degree of familiarity with teamwork, physical activity, and group dynamics (i.e., collective beliefs). The five most popular and successful team sports at the institution of the researchers were used for this study (rugby union, soccer, field hockey, basketball, and netball). Consistent with the university's ethical guidelines, participants provided informed written consent before participation.

Measures

Collective Efficacy.

The Collective Efficacy Questionnaire for Sport [AUQ1](CEQS; Short, Sullivan, & Feltz, 2005) was employed to measure individual-level perceptions of collective efficacy. The CEQS is a 20-item questionnaire consisting of five factors: effort, persistence, ability, preparation, and unity. Ratings were made on a 10-point rating scale ranging from 0 (*not at all confident*) to 9 (*completely confident*). Construct validation of the measure with college-age student-athletes (Short et al., 2005) using confirmatory factor analysis has indicated that the model is robust (CFI = .92, NNFI = .90, SRMR = .06), the exception being the error of approximation statistic (RMSEA = .10), which represents a mediocre fit (see Browne & Cudeck, 1993). Short et al. (2005) also reported strong internal reliability (α range = .85–.96), with similar findings evident for this study (α = .91).

Procedure

The experiment was 15 days in duration, with participants required to attend two sessions on day 1 and day 15, respectively. To maximize motivation, participants were told that they were to participate in a U.K.-wide experiment on teamwork, competing in a task requiring balance, coordination, and team work (i.e., an "egg and spoon" race combined with a team obstacle course) similar to that used by Shearer, Mellalieu, Thomson, and Shearer (2007). The obstacle course consisted of 13 cones, two upturned benches, one speed ladder, three hula-hoops, five step boxes, three badminton posts, two badminton nets, and three chairs spanning the dimensions of a basketball court and was to be completed in an anticlockwise direction (Figure 1). Teams were informed of the competitive nature of the experiment and thus instructed to perform to the best of their abilities. Teams were led to believe that they were participating as representatives of their university and that several teams had already taken part in the experiment from other U.K.-based universities. This was demonstrated by showing the participants a false datasheet, with a large sample size and names of universities from all over the United Kingdom.

\ Insert Figure 1 \

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

Once formed, each team had three timed practice trials for the obstacle course task. The task was setup in a relay format, requiring each of the three team members to complete the obstacle course in the fastest time possible. Once each participant had completed the obstacle course, they would transfer the ball to the next participant (interactive component); subsequently, the ball was transferred from the first participant to the second, and from the second to the third, until all three had completed the course. Time penalties of 5 s were added to each team's overall time for any mistakes they made while completing the course. For example, time penalties were given for touching the golf ball with anything other than the spoon (even during exchange from teammate to teammate), dropping the golf ball, putting a foot down while crossing the benches, or touching/moving the nets. Each section of the course was adjudicated by a member of the research team. The team was given 5 min to rest; the procedure was then completed two more times. Upon completion of the third trial, the team was provided with a false average time for the three trials, and this was identified as a mediocre time lying in the middle tenth of the fictitious database provided for all participants across other U.K. universities. Participants were informed that all forms of practice were prohibited and asked to return in 14 days to the laboratory, before participation in a competitive trial to be used for the U.K.-wide experiment.

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

When the participants returned to the laboratory 14 days later, the competitive trials were fully explained and each team was reminded of the task requirements and their mediocre results in the practice trials. Each of the teams completed the CEQS for the first time (preintervention), after which they were informed that they would take part in the competitive trial in 30 min. Upon completion of this first measure, their respective intervention strategies were administered. Once the intervention was complete, collective efficacy responses were recorded for the second time (postintervention) using the CEQS, and the participants were debriefed about the real purpose of the experiment.

Data Analysis

Data were screened for normality and homogeneity of variance using the Shapiro-Wilk test and Levene's test, respectively. A mixed 3 × 2 (condition × time) model ANOVA was used to examine the data for main effects and interactions of the independent variables. Specifically, condition (positive/neutral/negative) was used as the between-subjects factor, while time (preintervention/postintervention) was used as the within-subjects factor. Simple planned contrasts were used to make comparisons between time (first) and condition (last). In addition, Gabriel's procedure was used for post hoc analysis, as this test is accurate when sample sizes are unequal (Field, 2009). All statistical procedures were conducted using SPSS for Windows, version 19, utilizing a minimum significance level of $p = .05$.

Results

Data Screening

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

Collective Efficacy Scores

An alpha level of .05 was used for the initial analyses. The mixed 3 × 2 ANOVA results for the overall CEQS scores suggested a nonsignificant main effect within groups for time, between the pre- and postintervention measures (F [1,130] = .31, $p > .05$, $r = .05$), a significant main effect between groups for condition (F [2,130] = 16.04, $p < .05$, $r = .33$), and a significant interaction between time and condition (F [2,130] = 47.99, $p < .05$, $r = .52$). (An identical pattern of findings was derived when the separate dimensions of collective efficacy were operationalized. The results of the ANOVAs are available from the author upon request.) Closer inspection of the score profiles indicated the nature of the difference between the three conditions (see Figure 2). Specifically, preintervention collective efficacy scores (Table 1) indicated little difference between the positive ($M = 6.51$, $SD = 0.81$), neutral ($M = 6.49$, $SD = 0.80$), and negative conditions ($M = 6.40$, $SD = 0.78$). Post hoc analysis using Gabriel's procedure showed postintervention differences in collective efficacy between the positive and negative conditions ($M_{diff} = .86$, $SE = .16$, $p < .05$) and the neutral and negative conditions ($M_{diff} = .72$, $SE = .17$, $p < .05$); however, no differences were observed between the positive and neutral conditions ($M_{diff} = .15$, $SE = .16$, $p > .05$). Specifically, an increase was observed in mean scores for both the positive ($M = 7.06$, $SD = 0.71$) and neutral conditions ($M = 6.78$, $SD = 0.92$), with a decrease evident for the negative condition ($M = 5.44$, $SD = 1.12$).

\ Insert Figure 2 \ and Table 1 \

Study 2

Method

Participants

Participants ($n = 36$) were recruited via opportunity sampling from a university men's basketball squad ($n = 18$, $M_{age} = 21.73$ years, $SD_{age} = 1.51$ years) and other interactive sports teams ($n = 18$, $M_{age} = 21.94$ years, $SD_{age} = 1.76$ years). Basketball players competed for either the men's 1st team or 2nd team in British Universities Western Divisions 1A and 2B, respectively. Interactive team sports players were recruited from other popular sports at the same institution (rugby union, soccer, and field hockey). Basketball players were recruited for participation in this study because the controlled environment for competitive fixtures allowed for the collection of detailed video footage. Participants from other interactive teams were recruited because of their understanding of competitive sport and their relative lack of understanding of basketball performance. Together, these two subsamples provided an opportunity to examine the effect of content familiarity upon collective efficacy responses to positively oriented video footage of competitive basketball. Consistent with the university's ethical guidelines, each of the participants provided informed written consent before participation.

Measures

Collective Efficacy.

Remaining consistent with the methods from Study 1, collective efficacy was measured using the CEQS (Short et al., 2005). Cronbach alpha coefficients indicated adequate internal reliability for the sample ($\alpha = .91$).

Procedure

Following recruitment of participants, informed consent was obtained for each individual. Video footage of the basketball teams participating in the study was collected over an 8-week period. During these dates, the men's 1st team took part in 11 competitive matches, and the 2nd team took part in six competitive matches, ranging from university league and cup to regional men's fixtures. Footage consisted of actual performance (on court), team interactions during performance (i.e., communication, team drills), and reactions to performance results (both on and off court, i.e., successful baskets/plays). Recordings focused on positive video footage (i.e., a celebratory reaction to success, a performer being pleased with performance, a successful completion of an action, a significant performance result). All video footage was edited using CyberLink PowerDirector 10 Ultra, producing 65 and 72 video clips for the men's first and second teams, respectively. In coordination with the university basketball coach, criterion was set for the development of both team-specific observation interventions. Specifically, all team members had to play an active role in at least two of the video clips, and all aspects of overall basketball performance had to be accounted for within the intervention as a whole. Subsequently, seven separate video clips lasting between 10 and 15 s were selected for both basketball teams' familiar observation intervention, lasting approximately 90 s in total. Accordingly, the nonbasketball participants were randomly allocated either the 1st ($n = 9$) or 2nd ($n = 9$) basketball team intervention for their unfamiliar observation intervention.

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

Data Analysis

Data were screened for normality and homogeneity of variance using the Shapiro-Wilk test and Levene's test, respectively. A mixed 2 × 2 (familiarity × time) model ANOVA was used to examine the data for main effects and interactions of the independent variables for the collective efficacy scores. Specifically, familiarity (familiar/unfamiliar) was used as the between-subjects factor, while time (preintervention/postintervention) was used as the within-subjects factor. All statistical procedures were conducted using SPSS for Windows, version 19, utilizing a minimum significance level of $p = .05$.

Results

Data Screening

CEQS data for each group was screened for the assumptions of normality at both pre- and postintervention. The Shapiro-Wilk test indicated that collective efficacy data for the familiar (D [18] = .90–.91, $p > .05$) and unfamiliar groups (D [18] = .94–.94, $p > .05$) was normal at both time points. The Levene's test reported equal variance in collective efficacy scores for both groups preintervention (F [1, 34] = .49, $p > .05$) and postintervention (F [1, 34] = .02, $p > .05$).

Collective Efficacy Scores

An alpha level of .05 was used for the initial analyses. The mixed 2 × 2 ANOVA results for the CEQS scores suggested a significant main effect within groups for time, between the preintervention and postintervention measures (F [1, 34] = 46.90, $p < .001$, $r = .76$), no main effect between groups for familiarity (F [1, 34] = 0.60, $p > .05$, $r = .04$), and a significant interaction between time and familiarity (F [1, 34] = 11.72, $p < .01$, $r = .51$). (An identical pattern of findings was derived when the separate dimensions of collective efficacy were operationalized. The results of the ANOVAs are available from the author upon request.) Closer inspection of the score profiles indicated the nature of the difference between the groups (see Figure 3). Specifically, preintervention collective efficacy scores recorded using the CEQS (Table 2) [AUQ2]identified that the familiar group had a lower mean score ($M = 6.16$, $SD = 1.08$) than the unfamiliar group ($M = 6.52$, $SD = 0.82$). However, an increase was observed in postintervention mean scores for both the familiar group ($M = 7.03$, $SD = 1.02$) and unfamiliar group ($M = 6.81$, $SD = 0.87$); this increase was greatest for the familiar group.

\ Insert Figure 3 \ and Table 2 \

Discussion

Taken together, our study findings promote observation interventions as a means to manipulate individual collective beliefs in groups. The results from Study 1 support the assumption that the content (positive, neutral, negative) of an observation intervention can be used to manipulate individual collective efficacy perceptions. The positive intervention caused an increase in collective efficacy beliefs comparable to previous findings examining positive imagery and collective efficacy (e.g., Munroe-Chandler & Hall, 2004; Shearer, Mellalieu et al., 2009). Observation of video footage with negative content resulted in decreased collective efficacy beliefs, a similar finding to that reported in the existing imagery literature. Specifically, negative imagery use is associated with decreased motor skill performance (Woolfolk et al., 1985), sport performance (e.g., Taylor & Shaw, 2002), and self-efficacy (Short et al., 2002), all correlates of collective efficacy. As similarities exist between imagery and observation, we would therefore expect imagery content and observation content to hold a comparable influence toward collective efficacy perceptions.

Observation interventions have the capacity to provide an individual with both mastery experiences and vicarious experiences. When referring to the provision of mastery experiences through observation, the direction of change in collective efficacy beliefs will ultimately depend upon the content of the observation intervention. Bandura (1997) suggests that negative mastery experiences (i.e., failures) undermine efficacy development—this effect being greatest when beliefs are yet to be firmly established, as was observed in Study 1. Moreover, when considering observation as a form of vicarious experience, it is logical to assume an association can exist in both a negative and positive direction. Goddard et al. (2004) suggest that when an observer is viewing an identifiable model, a change in their efficacy beliefs will coincide with the nature of the model's performance. Previous research has opted to use positive imagery and observation tactics when manipulating efficacy beliefs (e.g., Dowrick, 1999; Shearer et al., 2007). However, our findings suggest that collective efficacy can be influenced in both a positive and negative direction, emphasizing the importance of video content when considering an observation intervention for efficacy manipulation.

The results from Study 2 partially support the assumption that content familiarity is important when considering the manipulation of collective efficacy beliefs through observation-based techniques. Individuals observing video footage of their own team performing successful actions experienced larger increases in collective efficacy beliefs than those observing video footage of an unknown team of a different sport. Support for our findings exists within previous modeling literature. Specifically, self-modeling and positive self-review have received support as interventions to enhance self-efficacy (see Dowrick, 1999, for a full review). Both of these observation types provide an individual with video footage of oneself performing an activity in a positive manner. As collective efficacy is considered the group equivalent to self-efficacy, and a relationship has been established between the two constructs, it seems reasonable that the largest efficacy response in our second study was found for individuals who viewed footage of their own team performing successfully. Bandura (1997, p. 94) suggests that the advantage of seeing oneself perform successfully is that it "provides clear information on how best to perform skills, and it strengthens beliefs in one's capability." Seeing oneself performing successfully potentially evokes a greater efficacy response than viewing an unknown in an identical context.

As collective efficacy is both rooted in and shares the antecedents of self-efficacy (Carron & Hausenblas, 1998), it is plausible that "seeing oneself" is equally applicable to "seeing one's group." When considering observation of one's team as an alternative to self-modeling, familiarity may have an important role in the effectiveness of this technique. Varying levels of success have been achieved in past research examining self-modeling and self-efficacy, and it is suggested that model similarity is a distinguishing factor between effective and ineffective studies (see Short & Ross-Stewart, 2009 for a review). Indeed, the findings from our study indicate that model, action, and environmental similarity are all important in the manipulation of efficacy beliefs. The observation intervention is most influential when the content is familiar to the individual involved, emphasizing the importance of content familiarity. However, individual collective efficacy perceptions are increased for the unfamiliar group also, suggesting that an observation intervention displaying positive group based footage may also positively influence the development of collective efficacy beliefs in those to whom the footage is unrelated. The potential for emotional reward has been cited as the main reason for media consumers watching sports performance (Raney, 2006). Indeed, competitive sports fixtures are highly emotive events for those that are indirectly involved (i.e., fans/audience), often leading to changes in various emotions while a performance is being viewed (i.e., arousal, self-esteem, mood; see e.g., Kerr, 1994; Wann, Brewer, & Royalty, 1999; Raney & Depalma, 2006). Use of video footage from a competitive team sports performance is therefore likely to evoke an emotional response from all individuals, no matter their familiarity with the sport/team displayed. We suggest that observation of any group displaying positive "group" characteristics and producing positive performance is likely to inspire an increase in individual collective efficacy beliefs. This effect is likely to be greatest when the individual is familiar to the content of the observation intervention (e.g., viewing one's team performing in a familiar situation). Sports fanship research suggests identification as an important motive for viewing sports performance, while various studies have reported increased self-esteem and confidence when viewing a favored team performing successfully (e.g., Hirt, Zillmann, Erickson, & Kennedy, 1992; Madrigal, 1995). Our findings also indicate that the level of identification an individual holds with a team dictates the size of emotional response. Therefore, if we consider watching positive team sports footage, we would expect the size of an emotional response (i.e., collective efficacy) to be dependent upon the individual's level of identification (i.e., familiarity) with the team involved.

From a practical perspective, our findings provide evidence for the use of observation interventions to increase individual-level collective efficacy beliefs for sports teams, with the potential for application to groups across other settings (e.g., military, educational, organizational). Our findings place emphasis on the need to control the content of video footage to ensure that an observation intervention has the desired influence upon an individual's collective efficacy beliefs. In a sporting context, teams may employ a team-specific observation intervention similar to that used in Study 2. For example, if a team often struggles with a certain play, video footage of them performing this successfully could be integrated within a training session, thereby increasing the team's collective efficacy beliefs and potentially leading to improved performance in this situation. In addition, a team viewing an intervention with positive content immediately before competitive performance may experience an immediate increase in collective efficacy beliefs to be carried through to competition.

Although our findings indicate observation can be considered an effective method for collective efficacy manipulation, there are some limitations to be considered in relation to the neutral intervention adopted in Study 1 and the population used for Study 2. Specifically, participants in the neutral condition in Study 1 reported experiencing a significant increase in collective efficacy beliefs postintervention, indicating that the content of the observation intervention used for this condition may have been unsuitable. The intervention included observation of obstacles used for the laboratory experiment, which may have caused individuals to imagine their team's previous performances in this setting. The use of three practice trials for the obstacle course task afforded the likelihood that the participants experienced a positive performance for at least one of the obstacles displayed. Therefore, although the video intervention provided the individual with less performance accomplishment information (mastery experiences) than that of the other conditions, its potential to evoke a positive emotional response may explain the subsequent increase in collective efficacy for the neutral condition. Future research should consider using a neutral intervention with no association to the task in hand. This may include observation of off-topic video footage, quotations from a book, or an appropriate alternative (see Betz & Schifano, 2000, for an example of an alternative neutral intervention). In Study 2, the development of the intervention required collection of video footage for both basketball teams across several fixtures. This meant it was only feasible to use two teams, and subsequently, our study population couldn't exceed 36 so as to avoid any biases. Despite this small population size, the within-subject and interaction effect sizes for this study (>.50) are classified as a large effect within previous guidelines (cf. Cohen, 1988, 1992), supporting the strength of the observation effect. If replicated, it is recommended that future research consider either using groups/teams with large populations or multiple groups/teams to ensure that the desired effects are attainable.

A further consideration in our study was the use of the CEQS measure to assess collective efficacy. Short and colleagues (2005) developed the CEQS as a domain-specific measure for use with sports teams. While this allows for greater measurement consistency between collective efficacy studies in sport, this does not follow Bandura's (2006)[AUQ3] recommendations for the development of context-specific scales that maximize concordance between the task and the measure of collective efficacy. Although the CEQS cannot achieve the same level of concordance, as it measures team qualities that are common across sports, it does overcome a number of inconsistencies in how collective efficacy has been conceptualized, operationalized, and measured within previous literature (cf. Baker, 2001[AUQ4]; Maddux, 1999[AUQ5]). Nevertheless, the utility of context- versus domain-specific measures is an important consideration for future collective efficacy investigation in sport. In addition, consistent with Bandura's (2006) guidelines and those of other measures used in efficacy-based research (e.g., Coaching Efficacy Scale; Feltz, Chase, Moritz, & Sullivan, 1999), this investigation used a 10-point rating scale to gauge efficacy strength for the CEQS. While this method has been employed previously, research has also questioned its effectiveness and suggested that rating scales of this size should be collapsed, as they are too large and can confuse the respondent (Myers, Wolfe, & Feltz, 2005). Indeed, Myers et al. (2005) provided evidence against the use of a 10-point scale using the Coaching Efficacy Scale to demonstrate that a 4-category rating scale option proved more effective. A revised form of the Coaching Efficacy Scale (CES II-HST; Myers, Feltz, Chase, Reckase, & Hancock, 2008) has also provided additional support for a 4-point rating scale over a 10-point scale. These findings suggest future investigation is warranted to specifically examine the ongoing psychometric properties of the CEQS and its utility in the measurement of collective efficacy.

Although our findings have shown that observation can be used to influence collective efficacy for groups partaking in physical activity and sport, researchers are yet to consider its effectiveness across other domains. There is a need to compare the effects of observation with other group dynamics interventions (e.g., traditional team building techniques) in alternate contexts (e.g., organizational) to determine the most suitable intervention for each setting. In Study 2, we used a group equivalent of positive self-review modeling, and there is a need to examine the effects of this observation type for groups across multiple domains (e.g., teaching faculties, army patrols). While our findings have shown that this observation type is an effective collective efficacy intervention, we did not consider the potential for other types of observation to influence collective efficacy. Future research should seek to compare different modeling types when considering observation interventions for individuals within groups. It is possible that other forms of observation will provide an individual/group with different sources of efficacy information to that identified for the observation method used in this research. This may include another subset of modeling known as feed-forward observation, which has the capacity to either display a skill that is not yet acquired or relay performance in a context that is yet to be addressed (Dowrick, 1999). In addition, while our investigation identified that group-based observation interventions can be used to influence collective efficacy, we did not consider its effect upon group performance. Although a large body of literature exists identifying a positive relationship between collective efficacy and group performance (see Stajkovic, Lee, & Nyberg, 2009, for a full review), and self-modeling has been shown to improve task performance (e.g., Feltz, Short, & Singleton, 2008), this relationship has not been considered at a group-level and represents an apparent area of future exploration.

Finally, part of the conceptual basis for our investigation is that similar neural activation exists for social cognitions (e.g., collective efficacy) and both the observation and execution of action, suggesting their potential involvement with the development of social phenomena such as collective efficacy beliefs. Specifically, evidence within cognitive neuroscience research shows the mirror neuron system (MNS) is activated both when an individual performs an action and when he or she views a similar action (for a review, see Gatti et al., 2013). Although consensus has yet to be reached on a specific function for the MNS, there is agreement that this system accounts for several aspects of human social cognition—for example, action understanding and motor intention (e.g., watching team mates perform a strategy correctly). Furthermore, empirical findings suggest cortical midline structures account for additional aspects of social cognition to those supposedly accounted for by the MNS (e.g., processing of social relationships; Iacoboni et al., 2004; Schilbach et al., 2006). Empathising with conspecifics' emotions is also proposed to activate similar brain areas that include but extend beyond the MNS to the limbic areas (which hold a close association with emotion) via the insula (cf. Carr et al., 2003). Consequently, when individuals consider perceptions of their groups' collective efficacy, it is likely that they empathise with the content of the observed behaviors (e.g., a positive reaction to a score), engaging these neural systems. Despite these potential neurosocial links, research has yet to directly measure the neural activity associated with collective efficacy development. No explanation exists for the actual mechanisms that underpin both its function and action (Shearer et al., 2009[AUQ6]). Comprehension of the manner in which observation influences collective efficacy will allow for the measurement of neural activity in both the MNS and cortical midline structures via functional magnetic resonance imaging. Findings from study 2 correspond with the findings from two neuroscience studies examining MNS activity associated with observation of motor skills in dance (Calvo-Merino et al., 2005, 2006). Greater MNS activity was identified when individuals observed movement patterns within their existing motor repertoire in comparison with movement patterns that were yet to be learned. As we have suggested, this motor area's strong association with both action observation and social cognition acts as grounds for its involvement within the development of collective efficacy. However, we did not measure MNS activity during observation of teammates, and we can therefore only suggest that changes in collective efficacy beliefs may have occurred via the mechanism by which MNS activity was increased for Calvo-Merino's studies. In line with the recommendations by Shearer and colleagues and the findings from this investigation, it is therefore feasible that observation can be adopted as a means to examine the neurological basis of collective efficacy, comparing brain activity associated with positive footage of their own group's performance with subsequent activity associated with unfamiliar group footage and neutral footage.

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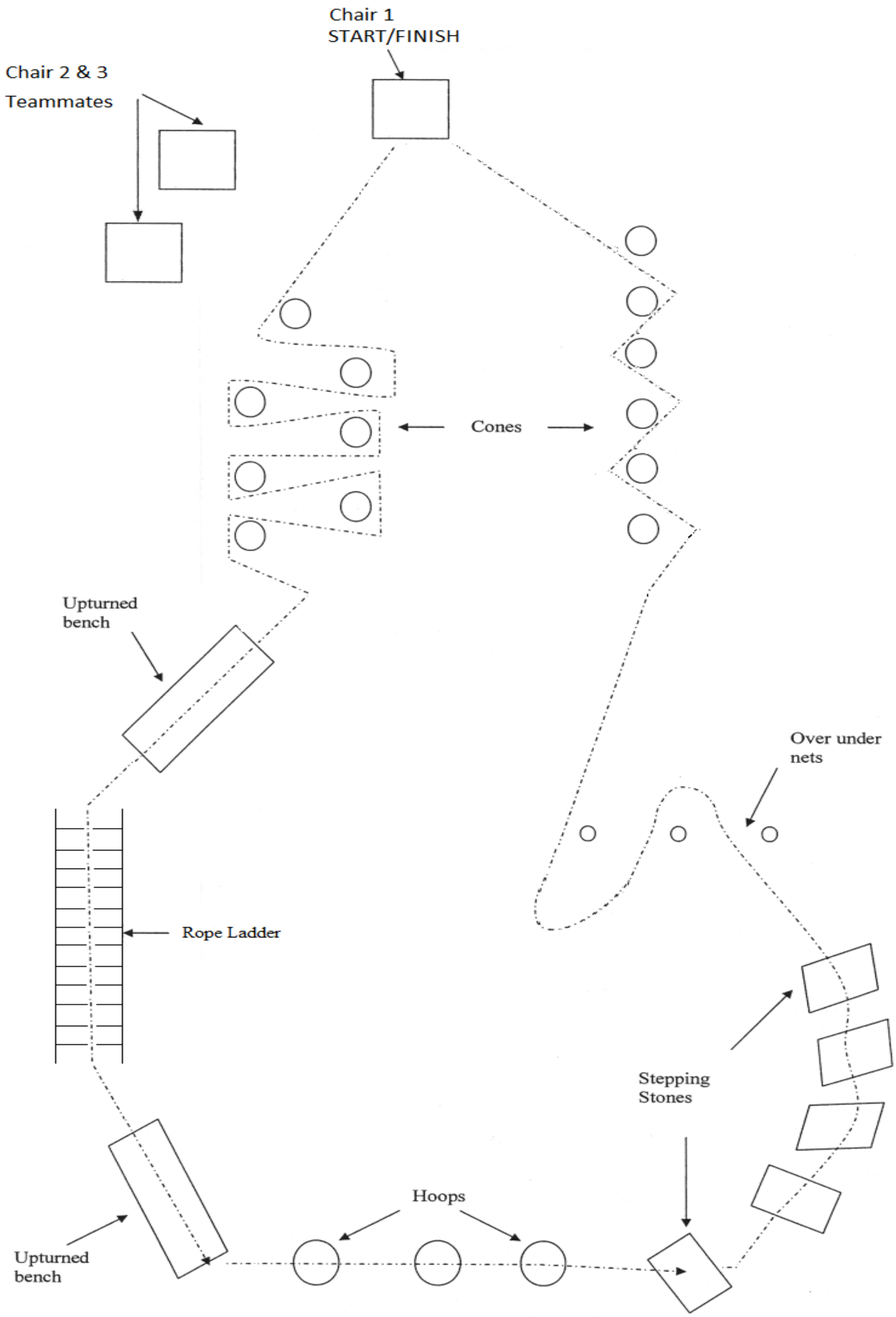

Figure 1 — Overhead view of the layout of the obstacle course used for the team-based task.

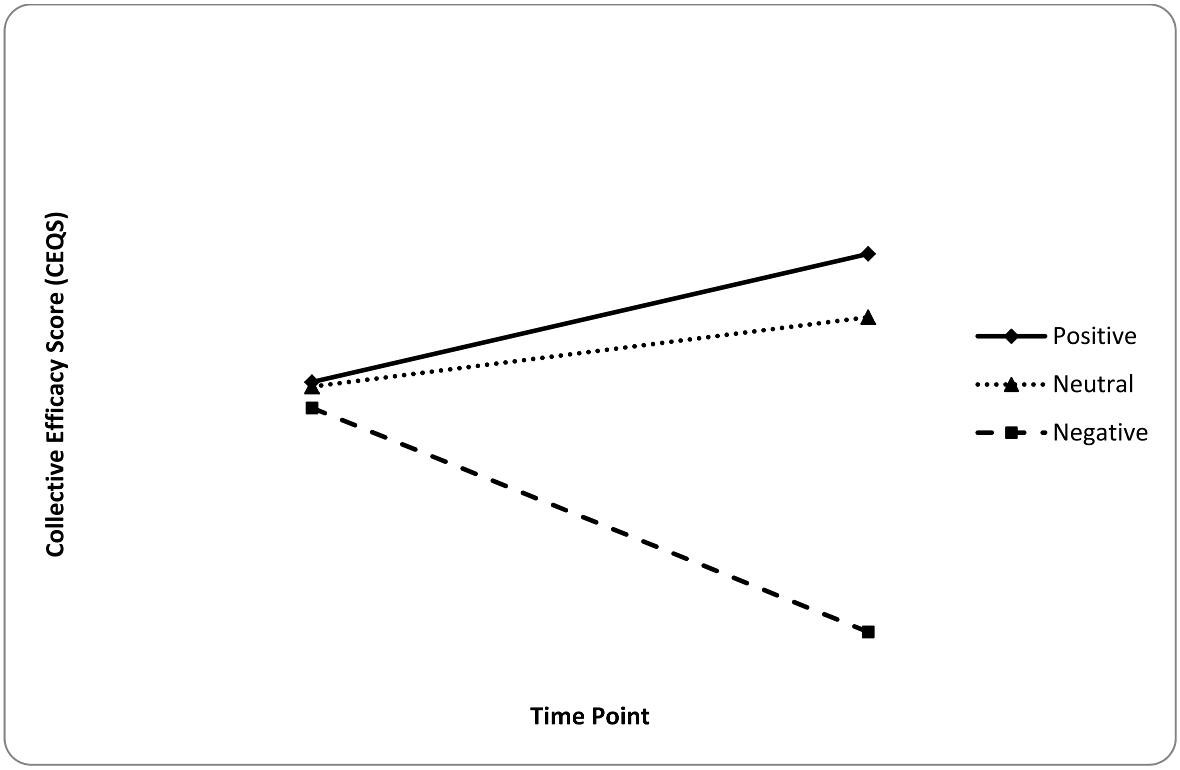

Figure 2 — Intervention effect upon collective efficacy beliefs for positive, negative, and neutral conditions.

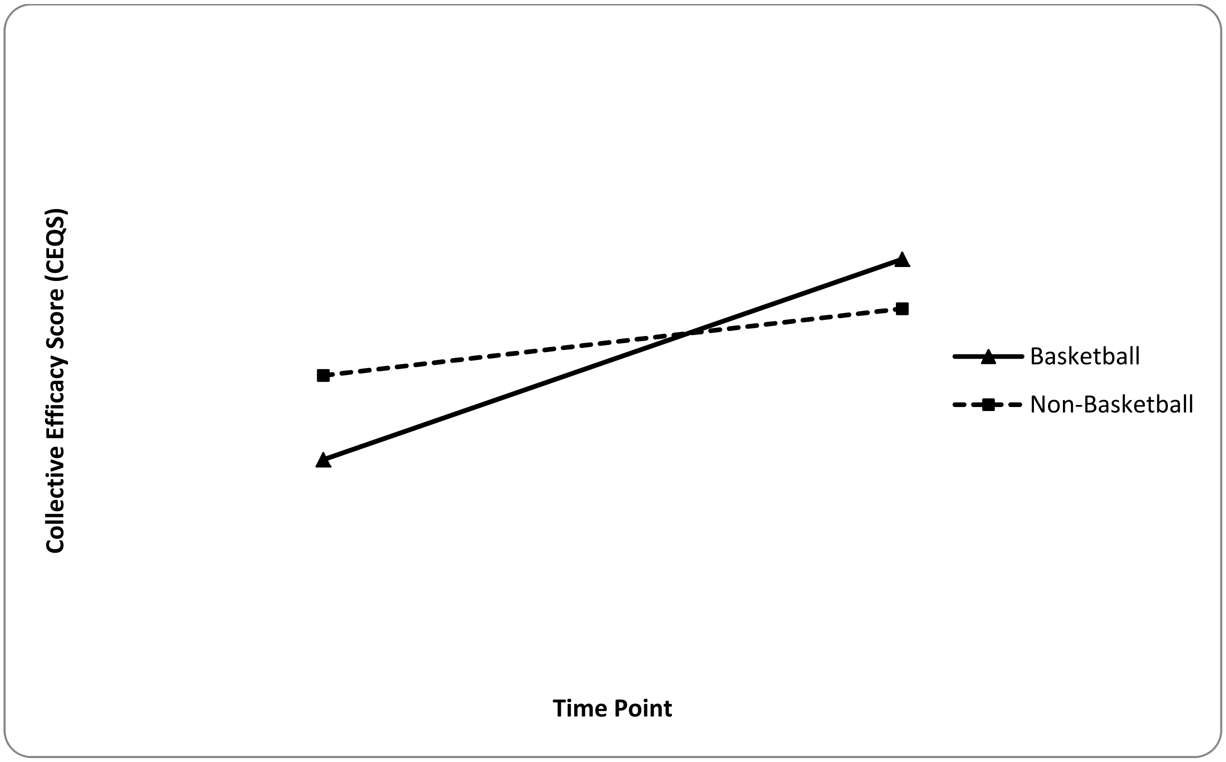

Figure 3 — Intervention effect upon collective efficacy beliefs for basketball and nonbasketball conditions.

Table 1 Mean and Standard Deviations for Pre- and Postintervention Collective Efficacy for Positive, Negative, and Control Conditions

Condition	Preintervention		Postintervention	
	M	*SD*	*M*	*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

Table 2 Mean and Standard Deviations for Pre- and Postintervention Collective Efficacy for Basketball and Nonbasketball Groups

Condition	Preintervention		Postintervention	
	M	*SD*	*M*	*SD*
CEQS				
Basketball	6.16	1.08	7.03	1.02
Nonbasketball	6.52	0.82	6.81	0.87

Author Queries

[AUQ1] Should this be "Sports" (plural)?

[AUQ2] Okay to change to “Table 2”?

[AUQ3] The in-text citation "Bandura’s (2006)" is not in the reference list. Please correct the citation, add the reference to the list, or delete the citation (here and throughout).

[AUQ4] The in-text citation "Baker, 2001" is not in the reference list. Please correct the citation, add the reference to the list, or delete the citation.

[AUQ5] Maddux, 1995 meant here?

[AUQ6] Which Shearer et al., 2009?

[AUQ7] Reference "Nunnally, Bernstein, 1994" is not cited in the text. Please add an in-text citation or delete the reference.