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“Yes, we can!”: Perceptions of collective efficacy sources in volleyball

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Abstract

Collective efficacy can be defined as a group's shared confidence that they will successfully achieve their goal. We examined which behaviours and events are perceived as sources of collective efficacy beliefs in a volleyball context. In Study 1, volleyball coaches from the highest volleyball leagues ($n = 33$) in Belgium indicated the most important sources of collective efficacy. This list was then adapted based on the literature and on feedback given by an expert focus group, resulting in a 40-item questionnaire. In Study 2, coaches and players from all levels of volleyball in Belgium ($n = 2365$) rated each of these sources on their predictive value for collective efficacy. A principal component analysis revealed that the 40 sources could be divided into eight internally consistent factors. Positive supportive communication (e.g. enthusiasm after making a point) was identified as the factor most predictive for positive collective efficacy beliefs. The factor referring to the negative emotional reactions of players (e.g. discouraging body language) was the most predictive for negative collective efficacy beliefs. These findings offer a starting point for the design of continuous measurements of collective efficacy through observation.

Keywords: Team confidence, group performance, instrument development, sports, coaching

Introduction

“You have to believe that you can make it!” Coaches, players, and other sport enthusiasts routinely talk about the importance of self-confidence. Psychologists refer to this concept as self-efficacy, defined as “the beliefs in one's capabilities to organise and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3). Researchers have revealed that self-efficacy strongly influences how much effort people expend and how persistent they are when facing obstacles (Pajares, 2006; Trevelyan, 2011). Consequently, self-efficacy has been proposed as a strong predictor of athletic performance (Bandura, 1977; Feltz, 1988; Miller, 1993; Ness & Patton, 1979; Weiss, Wiese, & Klint, 1989).

Although the majority of research on efficacy has examined individual efficacy beliefs, people do not live in social isolation. Many human activities require interaction among people working in groups. For instance, in team sports, the resulting performance is not simply the sum of individual efforts, but a more

complex interaction of the efforts of all team members. Bandura (1982) extended his theory with the concept of “collective” efficacy to explain group choices, coordinated team efforts, group motivation, and team performance.

Collective efficacy refers to a “group's shared belief in its conjoint capability to organise and execute the courses of action required to produce given levels of attainment” (Bandura, 1997, p. 477). Whereas self-efficacy refers to perceptions of “how well can *I* do it”, collective efficacy refers to perceptions of “how well can *we* do it”. In sport, it has also been labelled as team confidence or team efficacy: “We have to believe that we can make it *as a team*”.

Although collective efficacy is a relatively new construct in sport psychology, it has been linked to several favourable outcomes. Teams with a strong sense of collective efficacy set more challenging goals (Silver & Bufanio, 1996), exert more effort, persist longer when facing difficulties or defeat (Greenlees, Graydon, & Maynard, 1999), and are ultimately

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more likely to succeed (Bandura, 2000). Furthermore, a positive relationship between collective efficacy and team cohesion was observed in sports such as rugby and basketball (e.g. Kozub & McDonnel, 2000; Parrow, 2002), as well as in volleyball (Ramzaninezhad, Keshtan, Shahamat, & Kordshooli, 2009).

A positive relationship between collective efficacy and performance has been observed in football teams (Myers, Feltz, & Short, 2004a), ice hockey teams (Feltz & Lirgg, 1998; Myers, Payment, & Feltz, 2004b), basketball teams (Watson, Chemers, & Preiser, 2001), softball teams (Chou, Yu, & Chi, 2010), and in volleyball teams (Dithurbide, Sullivan, & Chow, 2009; Keshtan, Ramzaninezhad, Kordshooli, & Panahi, 2010).

However, little is known about the sources contributing to the development of collective efficacy. Bandura (1997) suggested that the four sources of self-efficacy may serve as sources of collective efficacy, namely, past performance, vicarious experience (or social comparison), verbal persuasion, and physiological/emotional states (e.g. arousal, fatigue or stress). However, the development of efficacy beliefs may differ between an individual and a team. This difference is supported by research in elite women's netball that reveals that team level effects are more important than individual level effects in predicting collective efficacy. More specifically, these team level predictors accounted for approximately 73% of the variance in collective efficacy at team level (Wilkinson, Fletcher, & Sachsenweger, 2011). These findings are supported by the existence of additional sources of collective efficacy in a team sport context such as past performance in practice or training sessions, preparation effort, and confident leadership (Chase, Feltz, & Lirgg, 2003; Chase, Lirgg, & Feltz, 1997; Watson et al., 2001).

Although past performance is generally thought to be the strongest source of efficacy beliefs (Bandura, 1997), limited research has been conducted to explore other sources of collective efficacy beliefs in a sport setting. Until now, researchers have focused only on the collective efficacy sources before the game, not during the game. However, these in-game sources might play an important role in predicting collective efficacy as well. Furthermore, no distinction has been made between sources of positive efficacy beliefs and sources of negative efficacy beliefs, which is unfortunate given the detrimental influence these negative efficacy beliefs can have on team performance.

In the present study, we extend previous research by investigating which information players and coaches use during a game to determine their in-game confidence in the abilities of their team to achieve a certain goal (e.g. winning the game).

Therefore, the main purpose of the current research was to identify the sources of positive and negative collective efficacy in volleyball, as perceived by players and coaches, not only before the game, but also during the game. A volleyball setting was chosen because this team sport requires continuous interaction between the players (Carron & Chelladurai, 1981), making it difficult to separate one's own functioning from that of the rest of the team (Lindsley, Brass, & Thomas, 1995). As a result, volleyball offers an interesting sport context for exploring the sources of collective efficacy.

Two studies were designed to realize our goals. Study 1 aimed to detect which information coaches use to assess the positive and negative collective efficacy beliefs of their volleyball players. Study 2 built on the results of Study 1 by asking volleyball coaches and players to indicate to what extent these sources do have predictive power for collective efficacy. Using principal component analysis, we examined whether the sources could be combined into distinct and meaningful components. Subsequently, we explored which of these factors are considered as the most predictive for collective efficacy.

Study 1

Our first study explored which information volleyball coaches use to assess the collective efficacy beliefs of their players. Based on previous literature, we expect that coaches will mention both general sources of efficacy, such as past performance (Bandura, 1997), as well as sources specific for the team context, such as team cohesion and confident leadership (Watson et al., 2001; Wilkinson et al., 2011).

Methods

Participants. The participants were 33 coaches of the highest leagues in volleyball in Belgium, including 20 coaches of women's teams and 13 coaches of men's teams.

Their mean age was 41 years ($s = 7.5$) and they had on average 17.6 years of coaching experience ($s = 7.1$). Twenty coaches worked with a team in one of the two highest levels out of 10, six coaches had a team on the third or fourth level, and six coaches trained a youth selection team. The majority of the coaches (88%) were the head coach of their team. A comparison of responders and non-responders revealed no significant differences in terms of gender, age, and experience, suggesting that the sample was representative for the invited population on these background characteristics.

Measures. An open-ended questionnaire was used to ask the coaches what they considered the most

important sources that affect collective efficacy within volleyball. Participants were encouraged to identify any possible source that came to mind, with the intent to create a relatively complete list of volleyball specific sources of collective efficacy.

Procedure. All coaches of the highest leagues in volleyball in Belgium ($n=75$) were electronically invited in the first half of season 2010–2011 to participate. Non-responders were sent a reminder 2 weeks later, which resulted in a 44% response rate. A detailed breakdown of the response rate for each level resulted in a response rate of 47% for the coaches on the two highest levels, 21% for the coaches of a team on the third and fourth level, and 56% for the coaches of a youth selection team.

This original pool of collective efficacy sources obtained from coaches was extended with sources from a literature review (Bandura, 1986, 1997). Afterwards a focus group met, including three professional researchers in the area of sport psychology, one applied sport psychologist who has worked with elite volleyball teams, the head coach of the Belgian women's national volleyball team, and five players, active on different levels, ranging from national to regional. They provided feedback with respect to item clarity and applicability in volleyball. As a result, the total number of sources was reduced considerably. An example of this adaptation process is that coaches mentioned twelve different, yet highly similar indicators of negative body language (e.g. shaking one's head, hanging one's head, shrugging or hanging one's shoulders, a dull gaze, averting one's eyes). All these sources were gathered into one source: "One or more players express a discouraging body language".

Finally, this list was adapted to both the perspective of the coach and the players: one version was formulated from the viewpoint of the coach (e.g. "As a coach I prepared the players tactically well for the game"), whereas the other was formulated from the players' viewpoint (e.g., "Our coach prepared our team tactically well for the game").

Results

In total, the coaches provided a list of 58 possible sources of collective efficacy. The most frequently mentioned source was decreased communication between the players (16 coaches), followed by enthusiasm after winning a point (11 coaches), and negative body language (10 coaches). A literature review provided additional sources such as the enthusiastic cheering of both field and bench players, and the expression of collective efficacy beliefs by the opposing team (Ronglan, 2007).

Adaptations based on advice from the focus group of experts resulted in 40 collective efficacy sources

(see Appendix). This final list contained pre-game sources (e.g. "My team won the last game against the same opponent"), sources during the warm-up (e.g. "The players warm up concentrated before the game"), as well as sources during the game (e.g. "The team comes together enthusiastically after making a point"). This wide variety of behaviours, body language, and other sources, all mentioned by experts as affecting a players' collective efficacy, served as a starting point for Study 2.

Study 2

In the present study, coaches and players from all 10 Belgian volleyball levels rated to what extent the 40 previously obtained sources have the power to predict collective efficacy. Based on previous qualitative research on sources of collective efficacy during the game (Ronglan, 2007), we anticipated that enthusiasm on the field and efficacy expressed by the leaders would be scored as the most important sources of positive collective efficacy. Furthermore, we assumed that negative body language would be indicated as predictive for negative efficacy beliefs.

Methods

Participants. The sample consisted of 2365 participants, including 603 coaches, 1083 players, and 679 individuals who combined both functions, not necessarily within the same team. Table I contains detailed information on the participants. Although the sample contained both male and female participants, most of the participants were males. This gender imbalance was also found in the total population of invited coaches (79% male coaches). This sample was thus representative for the dominance of male volleyball coaches in Flanders.

Measures. Recently, researchers have focused on four main approaches to measure collective efficacy in sports teams. The first method aggregates the self-efficacy perceptions of all individuals in a group. However, because group members rely on one another for performance, the concept of collective efficacy differs from self-efficacy (Bandura, 1982, p. 143). The second method uses a group discussion to obtain a single, group-level measure of collective efficacy. Although this method resembles the original definition of Bandura (1997), the validity of this method is questionable (Bandura, 1997; Paskevich, Brawley, Dorsch, & Widmeyer, 1999). Social persuasion and conformity pressures may bias the results towards the beliefs of the dominant characters within the team. The third method aggregates individuals' perceptions of their own collective efficacy, for instance, "I believe that my team will

Table I. Sample characteristics.

	Participants	Mean age (years)	Mean experience (years)	Gender Men (♂)/Women (♀)	Team gender
Coaches	603 (25%)	42.2	16.9	517 ♂ (86%) 86 ♀ (14%)	199 ♂ 338 ♀ 66 ♂ + ♀
Players	1083 (46%)	23.7	13.0	414 ♂ (38%) 669 ♀ (62%)	414 ♂ 669 ♀
Player-coaches	679 (29%)	32.3	18.0	435 ♂ (64%) 244 ♀ (36%)	231 ♂ 236 ♀ 212 ♂ + ♀
Total sample	2365	31.4	15.6	1366 ♂ (58%) 999 ♀ (42%)	844 ♂ 1243 ♀ 278 ♂ + ♀

win this game". In contrast, the fourth method aggregates individuals' perception of the team's collective efficacy, for example, "My team believes that we will win this game".

Although collective efficacy is defined as a group's shared belief, it still reflects individuals' perceptions of the team's capabilities (Bandura, 1997). In line with this, previous research indicated that both the third and the fourth method are equally suited to assess collective efficacy in sports teams (Bandura, 1997; Shearer, Thomson, Mellalieu, & Shearer, 2007).

However, it should be emphasized that the aim of the present study was not to measure collective efficacy but to examine which sources predict collective efficacy beliefs. To determine the predictive value of the 40 sources obtained in Study 1, participants assessed the items on a 7-point scale anchored by "When this item occurs I am totally convinced that my team will lose the game" (score of 1) and "When this item occurs I am totally convinced that my team will win the game" (score of 7). A neutral score of 4 indicated that no link was present between the source mentioned and the collective efficacy beliefs.

Procedure. The Flemish Volleyball Federation's database was used to contact 1999 licensed volleyball coaches in Flanders (Belgium) in the middle of season 2010–2011 and to invite them to complete the questionnaire. They were also asked to motivate their players to participate by referring them to the player-specific version of the questionnaire. In addition, 342 volleyball players known by the principal researcher were personally contacted. No incentives were given for participation in our study and participants were guaranteed full confidentiality.

Participants were referred to a web-based questionnaire, containing demographic questions and the 40-item list containing the sources of collective

efficacy. Non-responders were sent a reminder 2 weeks later, which resulted in a 64% response rate for the contacted coaches and a 69% response rate for the contacted players, which is high compared with the average response rate of 34% of an online web-based survey as reported in a meta-analysis (Shih & Fan, 2008).

Statistical analyses. We conducted a principal component analysis with Varimax rotation on the total sample. The Kaiser eigenvalue-greater-than-one rule was used to extract the components (Kaiser, 1960). An item was retained to construct a factor based on the component when it had a minimum loading of 0.40, without having a cross-loading higher than 0.40 on any other component. Cronbach's alpha coefficients were calculated to assess the internal consistency of each factor (Cronbach, 1951).

Finally, regression analyses were conducted to establish the impact of background characteristics on the perceived predictability of the factors. Each constructed collective efficacy factor was used as the criterion variable. The predictor variables were age, gender, male/female team, years of experience, and competition level, with function of the participant (player, coach or player-coach) as dummy variable. Because our large sample resulted in extreme statistical power, only significant relations with a β -value above 0.20 will be discussed (i.e. explaining at least 4% of the variance in perceived predictability of the team result).

Results

Construction of collective efficacy factors for players and coaches. The principal component analysis resulted in nine principal components with eigenvalues greater than 1, accounting for 56% of the variance. To construct a meaningful overarching structure of

collective efficacy factors, some adaptations were needed.

The internal consistency of initial factor 9, represented by the Cronbach's alpha coefficient, was 0.53 and thus unacceptable (Gronlund, 1981). Because the content of factor 8 and factor 9 overlapped (they both referred to the negative emotional reactions of the players), we combined them, which resulted in an acceptable alpha value of 0.66.

The principal component analysis thus resulted in eight collective efficacy factors. These factors were labelled as follows: (1) positive supportive communication, 7 items; (2) positive indications before the game, 6 items; (3) own team is in the lead in the game, 7 items; (4) interventions of the coach, 4 items; (5) positive emotional actions of the players, 3 items; (6) own team is behind in the game, 4 items; (7) errors of own team, 4 items; and (8) negative emotional reactions of the players, 5 items. Detailed information about the content of these factors can be found in the Appendix.

The correlation matrix of these factors is shown in Table II. Cronbach's alpha coefficients are provided in parentheses on the diagonal as estimates of internal consistency. The internal consistency of all factors was acceptable given that all Cronbach's alphas exceed 0.60 (Gronlund, 1981). As can be seen in Table II, all correlations between the positive (1–5) as well as between the negative (6–8) collective efficacy factors were moderate to high.

Predictive power for collective efficacy. Table III presents the factors, ranked from most predictive for positive collective efficacy to most predictive for negative collective efficacy. A score of 4 represents a neutral answer, meaning that no predictive power for collective efficacy was perceived.

Positive supportive communication was considered as the factor most predictive for positive collective efficacy. On the negative side of the scale, the factor referring to the negative emotional reactions of the players was considered as the most predictive for negative collective efficacy beliefs.

The perceptions of players and coaches were very similar. The same ranking emerged, with only one exception: coaches perceived their own interventions as more predictive for positive collective efficacy beliefs than players did. Separate linear regression analyses revealed that the relationships between the different background characteristics (age, gender, experience, and competition level) and perceived predictability of the factors did not exceed our criterion ($\beta > 0.20$). In other words, the predictability of the collective efficacy factors did not differ between males and females, young and old, low and high level, and experienced and not experienced respondents. This conclusion holds for coaches and players.

To investigate these results in more detail, we examined the predictability for collective efficacy at item level as well. Table IV presents the mean scores of the four sources perceived as most predictive for

Table II. Correlations and Cronbach's alphas for the eight collective efficacy factors.

Variable	1	2	3	4	5	6	7	8
1. Positive supportive communication	(0.83)							
2. Positive indications before the game	0.40**	(0.81)						
3. Own team is in the lead in the game	0.57**	0.51**	(0.77)					
4. Interventions of the coach	0.50**	0.40**	0.45**	(0.69)				
5. Positive emotional actions of the players	0.32**	0.28**	0.35**	0.27**	(0.64)			
6. Own team is behind in the game	0.27**	0.11**	0.26**	0.20**	0.08**	(0.79)		
7. Errors of own team	0.12**	0.10**	0.21**	0.15**	0.04*	0.54**	(0.74)	
8. Negative emotional reactions of the players	0.05*	0.10**	0.15**	0.13**	0.11**	0.43**	0.57**	(0.66)

* $P < 0.05$, ** $P < 0.01$.

Table III. Means at factor level for players, player-coaches, and coaches (7-point scale).

	All data	Players	Player-coaches	Coaches
1. Positive supportive communication	5.54 ± 0.64	5.46 (1)	5.55 (1)	5.66 (1)
2. Positive indications before the game	5.28 ± 0.90	5.29 (2)	5.29 (2)	5.24 (2)
3. Own team is in the lead in the game	5.13 ± 0.62	5.15 (3)	5.14 (3)	5.09 (4)
4. Interventions of the coach	5.06 ± 0.77	4.99 (4)	5.07 (4)	5.18 (3)
5. Positive emotional actions of the players	4.62 ± 0.97	4.66 (5)	4.66 (5)	4.49 (5)
6. Own team is behind in the game	3.66 ± 0.93	3.69 (6)	3.64 (6)	3.63 (6)
7. Errors of own team	3.43 ± 0.76	3.45 (7)	3.40 (7)	3.44 (7)
8. Negative emotional reactions of the players	3.11 ± 0.75	3.09 (8)	3.02 (8)	3.24 (8)

Note: The respective ranking of the factors is provided in parentheses. Standard deviations for the total population are included.

Table IV. Means of the four sources perceived as most predictive for positive (1–4) and negative (37–40) collective efficacy beliefs, out of the 40-item list, as a function of the respondents (coaches, player-coaches, and players).

	All data	Coaches	Player-coaches	Players
1. The team comes together enthusiastically after making a point	5.82 (1)	5.87 (2)	5.77 (1)	5.82 (1)
2. Athlete leaders within the team believe they will win the game and express this on the court	5.70 (2)	5.93 (1)	5.72 (2)	5.56 (3)
3. Enthusiastic cheering of both field players and bench players between rallies	5.67 (3)	5.74 (3)	5.63 (4)	5.66 (2)
4. The players communicate a lot between rallies (encouraging communication)	5.62 (4)	5.72 (4)	5.46 (3)	5.55 (4)
37. A player ignores a player who made an error, instead of encouraging him/her	3.13 (37)	3.56 (32)	3.01 (37)	2.95 (39)
38. A player does not dare to take difficult options	3.04 (38)	3.06 (38)	3.01 (38)	3.05 (37)
39. One or more players express discouraging body language.	2.90 (39)	2.84 (40)	2.79 (40)	3.01 (38)
40. A player reacts angrily and is frustrated when one of his/her teammates makes an error	2.88 (40)	3.18 (35)	2.80 (39)	2.77 (40)

Note: The respective ranking of the items is provided in parentheses.

positive collective efficacy beliefs and the four sources perceived as most predictive for negative collective efficacy beliefs.

The four sources perceived as most predictive for positive collective efficacy beliefs of the 40-item list were identical for coaches, player-coaches, and players. All these sources belonged to the factor “positive supportive communication”. On the negative side of the scale, the coaches and the players agreed to a large extent as well. All these sources belonged to the factor “negative emotional reactions of players”.

Similar linear regression analyses at factor level were conducted on each of these sources. Again, no significant differences regarding the background characteristics ($\beta > 0.20$) emerged, neither for coaches nor for players or player-coaches. These findings imply that the background characteristics do not influence the predictability of the perceived sources for collective efficacy.

Discussion

We examined the sources most predictive for collective efficacy in volleyball. The variety in the collective efficacy sources obtained in Study 1 revealed additional sources beyond the four efficacy sources originally proposed by Bandura (1997). In line with our expectations, coaches mentioned both general sources of efficacy, such as past performance, as well as sources specific to the team context. In contrast to previous studies, not only pre-game sources of collective efficacy were mentioned, but also sources during the warm-up and during the game.

Next, Study 2 determined the importance of these sources in predicting the collective efficacy of players and coaches during the game. Results revealed that the factor referring to positive supportive communication is perceived as most predictive for positive collective efficacy beliefs, by coaches, players, and player-coaches. This factor contains sources related

to enthusiasm on the court, as well as sources related to communication.

Consistent with our expectations, further analyses at item level indicated that the most decisive source for this factor was the enthusiasm after making a point. The importance of enthusiasm was supported by the high ratings of the item referring to the cheering by field and bench players. These enthusiasm-related sources are rather volleyball specific given the relatively high number of points scored in volleyball and the short break after each point, which makes it possible to come together and share the enthusiasm with teammates. Nevertheless, they can be linked with research findings in other sport settings. Ronglan (2007), for instance, revealed that in handball cheering and making joy on the court are also very important for attaining high collective efficacy standards within the team.

The expression of collective efficacy by the team leaders was perceived as the second most predictive factor of collective efficacy during the game. Moreover, for the coaches this factor tops the list. These findings are in line with our expectations and support other studies showing that leaders' high collective efficacy may lead to higher collective efficacy among group members (Bandura, 1997; Hoyt, Murphy, Halverson, & Watson, 2003; Ronglan, 2007; Watson et al., 2001).

Communication between the players completed the top four. To our knowledge, no research has been conducted on the relationship between players' communication and collective efficacy. Nevertheless, communication has been found to positively influence sport performance. For example, LeCouteur and Feo (2011) found that intense communication during play is crucial for a successful performance. In contrast, less frequent and negative communication has been suggested as being a predictor of a collective collapse (Apitzsch, 2009). Further research is needed to determine whether collective efficacy can be seen as the mediator of these relationships.

Although previous research findings have indicated that past performance is the strongest source of efficacy beliefs (Bandura, 1997; Chase et al., 2003), the present study reveals that positive supportive communication was rated as even more predictive for collective efficacy. This in-game source is thus even more important in predicting collective efficacy than sources before the game.

Furthermore, it is noteworthy that positive supportive communication was rated as more predictive for collective efficacy than the in-game performance sources (e.g. own team in the lead/behind in the game). In other words, if a team comes together enthusiastically, players and coaches are more confident in the team's ability to win the game than if the team is only performing well. Although many authors have reported a strong relationship between performance and collective efficacy in volleyball teams (Dithurbide et al., 2009; Keshtan et al., 2010), positive supportive communication might even be more predictive for collective efficacy.

On the opposite side of the scale, the factor referring to negative emotional reactions of the players was perceived as the most predictive for negative collective efficacy beliefs. Although some authors have reported the negative consequences of showing negative efficacy beliefs, for instance by motivating the opponent (Ronglan, 2007), they have not yet clarified which behaviours exemplify those negative efficacy beliefs. Analysis at item level provides a better understanding. The four most predictive sources, all belonging to the factor referring to the negative emotional reactions of players, were an angry reaction to a teammate's error, discouraging body language, not taking difficult options, and ignoring a player who made an error. When these behaviours emerged, players and coaches lost their confidence in the abilities of their team and perceived the situation as leading to a defeat.

Another aim of this study was to test whether collective efficacy perceptions would differ as a function of the various background characteristics. At factor level, players and coaches ranked the factors similarly. Even at item level, players, coaches, and player-coaches listed the same four of 40 items as the most important sources of collective efficacy. Also, on the negative side of the scale, strong agreement emerged. Regression analyses revealed only small effects for gender, age, experience, and level. We can therefore conclude that players and coaches, regardless of their age, gender, experience, and level at which they play or coach, share very similar perceptions about the sources predicting collective efficacy. As a result, the findings of this study can be considered very stable and applicable to many volleyball teams.

The present study extends previous research by examining the in-game sources of both positive and negative collective efficacy as perceived by players and coaches. Until now, research has only focused on collective efficacy before or after the game, not during the game. The only exception to date is a study about adventure racing teams in which the authors measured collective efficacy at three separate points in a race (Edmonds, Tenenbaum, Kamata, & Johnson, 2009). However, more continuous measurements during the game would allow variations in collective efficacy to be related to variations in game circumstances and with changing interactions among the players and their coach.

One of the reasons for this gap in the current literature is that in most team sports it is not possible to interrupt a player repeatedly during a game to measure his or her collective efficacy beliefs. Observational data might provide a viable alternative for these self-report measures. As a consequence, there is a clear need in sports sciences research to establish observable indicators that clearly reflect a player's collective efficacy beliefs.

It is therefore noteworthy that in the present study the collective efficacy sources most predictive for positive collective efficacy (i.e. "positive supportive communication") and those most predictive for negative collective efficacy (i.e. "negative emotional reactions of players") are clearly observable in-game behaviours. These sources may thus offer a starting point for the design of a continuous measure of players' collective efficacy beliefs through observation. Such measurement would highlight the dynamic nature of collective efficacy, even within a single game, and provide more insight in how to attain and maintain high collective efficacy.

The strengths of this study include the large sample size and the broad variety of players and coaches, active at all levels of the sport, ranging from youth to recreational players to professionals. The sample included both men and women of different ages and experience. This variety allowed us to examine whether these characteristics influenced the perception of collective efficacy sources. The large sample size and the correspondence between the perceptions of coaches, player-coaches, and players testify to the reliability of our findings.

The study also had some limitations. First, because only volleyball athletes and volleyball coaches participated, the findings are volleyball specific and it remains to be determined whether they apply to other sports. Second, the results were based on the perceptions of players and coaches instead of on objective characteristics of the situation. On the other hand, Shaver (1975) suggested that an individual's perception of a situation is more important than the objective situation in determining one's feelings and

actions. Consequently, we assume that the perceptions of players and coaches will be decisive for their collective efficacy beliefs. Nevertheless, in the future researchers should investigate whether there is a link between collective efficacy sources and collective efficacy beliefs in an official game.

Furthermore, researchers should attempt to experimentally determine the causal link between collective efficacy and its most important sources: enthusiasm, collective efficacy of team leaders, communication, and encouraging body language. For instance, future research could focus on how leaders' high collective efficacy is communicated to their followers and how, as a consequence, the collective efficacy beliefs spread throughout the entire team.

To facilitate optimal team performance, coaches should pursue high collective efficacy standards within their team. For this to happen, our findings suggest that coaches should stress the importance of enthusiasm and communication and train their athletes to continue communicating, even when the team is losing. In addition, coaches should encourage the captain or other leaders within the team to take responsibility by expressing their collective efficacy beliefs and contribute in this way to a better performance.

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Appendix: Detailed statistics: Factor loadings, means on factor and item level (7-point scale), and standard deviations

	Collective efficacy factors and associated items	Factor loading	mean	s
1. Positive supportive communication		5.54	0.64	
1. The players communicate a lot between rallies (encouraging communication)	0.78	5.62	0.85	
2. The players communicate a lot before and during rallies (tactical communication)	0.72	5.40	0.93	
3. My team comes together enthusiastically after making a point	0.67	5.82	0.84	
4. The players listen carefully during a time-out	0.67	5.19	0.94	
5. Enthusiastic cheering of both field players and bench players between rallies	0.62	5.67	0.89	
6. Athlete leaders within the team believe they will win the game and express this on the court	0.56	5.70	0.92	
7. The players warm up concentrated before the game	0.50	5.38	1.00	
2. Positive indications before the game		5.28	0.90	
8. My team won the two last games	0.79	5.27	1.32	
9. My team is higher ranked than the opponent	0.75	5.20	1.29	
10. Last weekend we won our game	0.73	5.05	1.33	
11. My team won the last game against the same opponent	0.66	5.53	1.27	
12. My team played well during the last game	0.54	5.36	1.06	
13. My team is fit. No player is injured	0.43	5.25	1.24	
3. Own team is in the lead in the game		5.13	0.62	
14. My team is in the lead at the technical time-out of 16 points	0.67	5.28	0.93	
15. My team is in the lead at the technical time-out of 8 points	0.64	4.74	0.92	
16. Spectacular powerful attacks of own team	0.59	5.42	0.98	
17. My team wins a long rally	0.57	5.38	0.84	
18. During the first 10 points of the game my team played really well	0.53	5.37	1.02	
19. The coach of the opponent takes time-outs or substitutes players	0.53	5.02	1.06	
20. The players gather quickly at a time-out or after changing sides	0.41	4.68	0.89	
4. Interventions of the coach		5.06	0.77	
21. The coach gave the team a motivational pep talk before the game	0.65	5.08	1.07	
22. The coach prepared the team tactically well for the game	0.63	5.24	1.09	
23. Last week my team trained well	0.62	5.21	1.00	
24. The coach let the players think along in determining the game strategy	0.57	4.72	1.12	
5. Positive emotional actions of the players		4.62	0.97	
25. A player starts to intimidate or challenge the opponent	0.73	4.33	1.26	
26. A player reacts forcefully after scoring a point	0.66	4.56	1.36	
27. A player starts to play the crowd and motivate them to cheer	0.60	4.97	1.17	
6. Own team is behind in the game		3.66	0.86	
28. Own team is 5 points behind after the second technical time-out (16 points)	0.79	3.18	1.16	
29. Own team is 5 points behind during the first half of a set	0.77	3.96	1.00	
30. Own team is 5 points behind during the game	0.75	3.50	1.06	
31. The players of the opposing team clearly demonstrate their conviction that they will win the game	0.51	4.01	1.17	
7. Errors of own team		3.43	0.76	
32. Within the same rotation a team loses three or more consecutive points by errors in reception	0.72	3.16	1.08	
33. Within the same rotation a team loses two or more consecutive points by errors in reception	0.69	3.90	1.00	
34. A player misses a serve after a serving error by a teammate	0.68	3.54	0.95	
35. One or more players fail to fulfil the tactical arrangements	0.55	3.13	1.01	
8. Negative emotional reactions of the players		3.11	0.75	
36. A player ignores a player who made an error, instead of encouraging him/her	0.75	3.13	1.20	
37. A player reacts angrily and is frustrated when one of his/her teammates makes an error	0.63	2.88	1.09	
38. A player becomes frustrated upon dubious decisions by the referee	0.62	3.58	1.13	
39. A player does not dare to take difficult options	0.56	3.04	1.18	
40. One or more players express discouraging body language	0.54	2.90	1.16	