

3
4
5
6
7
8 Collective efficacy or team outcome confidence? Development and validation of the
9 Observational Collective Efficacy Scale for Sports (OCESS)

10
11
12 Fransen, Katrien¹, Kleinert, Jens², Dithurbide, Lori³, Vanbeselaere, Norbert⁴, & Boen, Filip¹.

13
14 ¹ Department of Kinesiology, KU Leuven, Leuven, Belgium

15 ² Institute of Psychology, German Sport University Cologne, Köln, Germany

16 ³ School of Health and Human Performance, Dalhousie University, Halifax, Canada

17 ⁴ Center for Social and Cultural Psychology, KU Leuven, Leuven, Belgium

18
19 E-mail address of lead author: Katrien.Fransen@faber.kuleuven.be

20
21
22
23 **Acknowledgments**

24 This research was supported by a PhD Fellowship (Aspirant) of the Research Foundation
25 Flanders (FWO), awarded to Katrien Fransen.

26

Abstract

27

28

29

30

31

32

33

34

35

36

37

38

39

40

Although collective efficacy has been demonstrated to be an important precursor of team performance, there remains some ambiguity concerning its assessment. Therefore, the main aim of the present study was to test the validity of previous collective efficacy measures. An online survey was completed by 4,451 Flemish players and coaches from nine different team sports. The results revealed two distinct and reliable scales; process-oriented collective efficacy (i.e., the confidence in the team's skills to accomplish processes that could lead to successes) and outcome-oriented team confidence (i.e., the confidence in the team's ability to obtain a goal or win a game). Furthermore, we established the validity of a 5-item Observational Collective Efficacy Scale for Sports (OCESS) as short measure of process-oriented collective efficacy. Because the OCESS only includes observable behaviors, this scale has the potential to be a starting point for the development of a continuous in-game measure of collective efficacy.

Keywords: instrument development, team confidence, continuous measure, team sports, dynamic measurements, in-game variation

41 Collective efficacy or team outcome confidence? Development and validation of the
42 Observational Collective Efficacy Scale for Sports (OCESS)

43 The performance of athletes can vary strongly during a sports game. Players'
44 confidence in the team's capabilities is often mentioned as one of the factors that characterize
45 these performance variations throughout the game. For example, a sudden collapse in team
46 performance is often attributed to a drop in the team's confidence. Conversely, team
47 confidence is assumed to be a prerequisite for fighting back when the team is lagging behind.
48 Arsenal coach Arsene Wenger adds that "confidence is the easiest thing to lose in football and
49 the most difficult to win back" (Mangan, 2013). Bandura (1997, p. 477) termed this
50 confidence 'collective efficacy', defined as "the group's shared belief in its conjoint capability
51 to organize and execute the courses of action required to produce given levels of attainment."

52 **Collective Efficacy as a Dynamic Construct**

53 Bandura (1997) stated that collective efficacy has an effect on what a team chooses to
54 do, how much effort is instilled into a task, and how persistent the team is. These claims have
55 been supported in research showing that teams with strong collective efficacy beliefs tend to
56 set more challenging goals (Silver & Bufanio, 1996), exert more effort, and persist longer in
57 the face of adversity (Greenlees, Graydon, & Maynard, 1999). As a result, a positive
58 relationship has been revealed between collective efficacy and sport performance; the more
59 the players believe in the team's capacities, the better they perform and vice versa
60 (Dithurbide, Sullivan, & Chow, 2009; Hodges & Carron, 1992; Keshtan, Ramzaninezhad,
61 Kordshooli, & Panahi, 2010; Myers, Feltz, & Short, 2004; Myers, Payment, & Feltz, 2004).

62 It is important to emphasize that collective efficacy is not a fixed trait, but a dynamic
63 construct (Myers & Feltz, 2007). In other words, the individual's beliefs in the capabilities of
64 his or her team may change in the course of weeks, days, or even during a game. Especially
65 these changes in the course of a competition seem often responsible for winning or losing. To

66 investigate this close link between collective efficacy and performance, Bandura (1997, p. 67)
67 stated that “the relationship between efficacy beliefs and action is revealed most accurately
68 when they are measured in close temporal proximity.” Myers and colleagues (2007) added
69 that only research designs allowing for simultaneous measures of both efficacy and
70 performance would provide maximal information about their dynamic relationship during a
71 competition. However, in contrast with these guidelines and collective efficacy’s dynamic
72 nature, the concept has traditionally been measured as a trait concept or at best before or after
73 a game, but not during a game. The only exception is a study by Edmonds, Tenenbaum,
74 Kamata, and Johnson (2009), who attempted to measure collective efficacy beliefs of
75 adventure racing teams at three time points during the race. Their results supported the
76 dynamic nature of collective efficacy; as the collective efficacy of the more successful teams
77 increased throughout the race, subsequent performance improved, and vice versa for the less
78 successful teams.

79 **How to Measure Collective Efficacy? Resolving the Ambiguity**

80 According to the definition of Bandura (1997), efficacy beliefs are future-oriented
81 judgments about capabilities to organize and execute the courses of action. In other words,
82 efficacy measures have to address the skills, properties, or other descriptions of (inter-)
83 personal conditions that assist in successful performance. However, the existing collective
84 efficacy research is characterized by inconsistencies in the manner in which collective
85 efficacy is conceptualized, operationalized, and measured (Shearer, Holmes, & Mellalieu,
86 2009). For instance, current measures of collective efficacy vary with respect to the extent in
87 which they correspond to the original definition of efficacy by Bandura (1997). In line with
88 previous research (Collins & Parker, 2010), we can distinguish two types of measures.

89 The first type evaluates the athletes’ confidence in their team’s skills to accomplish the
90 processes that can lead to success (i.e., process-oriented, e.g., “I believe that the players in my

91 team will encourage each other during the game”). Because this type of measure addresses
92 the belief in the team’s abilities to optimize the process (e.g., items measuring motivational
93 and communication skills that help a team to be successful), it conforms to Bandura’s original
94 definition of collective efficacy. We will term this measure “collective efficacy” (in the
95 proper process-oriented sense). Collective efficacy thus focuses on athletes’ confidence in the
96 process of their own team, rather than comparing their own abilities with those of the
97 opposing team.

98 In contrast, the second type of measure focuses on outperforming the opponent and
99 refers to athletes’ confidence in the abilities of their team to obtain a certain outcome (i.e.,
100 outcome-oriented, e.g., “I believe that my team will outplay the opposing team and win this
101 game”). This measure refers to the confidence in the outcome rather than the confidence in
102 the process and focuses on the comparison with the other team, rather than on the own team.
103 Therefore, this measure is not congruent with Bandura’s original definition of collective
104 efficacy. We will therefore term this outcome-oriented measure “outcome-oriented team
105 confidence”, shortened as “team outcome confidence”. Despite the fact that this outcome-
106 oriented team confidence does not measure collective efficacy as originally defined, a number
107 of studies used these measures to allegedly assess collective efficacy (e.g., Chen et al., 2002;
108 Fransen et al., 2012; Spink, 1990; Tasa, Taggar, & Seijts, 2007; Vargas-Tonsing &
109 Bartholomew, 2006). Although previous research (Myers & Feltz, 2007) already
110 recommended against single-item performance measures, typically, the one-item measures
111 used in these studies are outcome-oriented rather than process-oriented, and as such, they
112 measure team outcome confidence rather than collective efficacy (e.g., “What placing do you
113 expect to attain?” or “To what extent do you believe that the team can finish in at least the top
114 10 teams?”). For example, Edmonds and colleagues (2009) attempted to measure the dynamic
115 evolution of collective efficacy in an adventure race by using the one-item measure “How

116 confident are you in the team's ability in executing the mountain biking portion of the race in
117 order to secure a top-place finish?" Because this item is more outcome-oriented than process-
118 oriented, the authors actually assessed the dynamic variation in team outcome confidence
119 rather than the variation in collective efficacy.

120 Nevertheless, several studies did assess collective efficacy in accordance with the
121 original process-oriented definition of Bandura (1997). An example of a widely used measure
122 of collective efficacy is Short, Sullivan, and Feltz's Collective Efficacy Questionnaire for
123 Sport (CEQS; 2005). The CEQS represents collective efficacy as a multidimensional
124 construct based on Bandura's (1997) argument that efficacy beliefs include beliefs in the
125 physical tasks but also beliefs in the capability to manage thoughts, actions, emotions, and
126 motivation (Dithurbide & Feltz, 2012, p. 260). The CEQS (2005) comprises a five-factor
127 structure (i.e., five subscales) measured with four items each. These five subscales include:
128 Ability (e.g., "to outplay the opposing team"), Effort (e.g., "to play to its capabilities"),
129 Persistence (e.g., "to persist when obstacles are present"), Preparation (e.g., "to devise a
130 successful strategy"), and Unity (e.g., "to be united").

131 Given the ambiguity in the current literature concerning the assessment of collective
132 efficacy, the main aim of the present study is to investigate the validity of the measures used
133 to assess collective efficacy. As mentioned above, the one-item measures used to assess
134 collective efficacy often focus on the outcome (i.e., performing better than the opponent), and
135 as such assess outcome-oriented team confidence rather than process-oriented collective
136 efficacy. Consequently, these outcome-oriented one-item measures cannot be used as
137 reference measurement of collective efficacy in team sports. In line with this argument, the
138 validation study by Short and colleagues (2005) revealed a lower correlation between the
139 Ability subscale and the other subscales (.59 - .78) than the correlation among the other
140 subscales (.76 - .94). Looking more closely at the factors and items of the CEQS (Short, et al.,

141 2005), it can be inferred that the items of the Ability subscale are outcome-oriented, rather
142 than process-oriented (e.g., “Rate your team’s confidence, in terms of the upcoming game or
143 competition, that your team has the ability to outplay the opposing team”). Despite the
144 evidence found for the internal consistency of each subscale of the CEQS, the conceptual
145 unity of these different subscales can be questioned. Once clarity is obtained about the
146 reliability of the different collective efficacy measures, the second aim of our study can be
147 realized; the validation of a new and short five-item scale of collective efficacy
148 (Observational Collective Efficacy Scale for Sports; OCESS) that can be used as a starting
149 point for more dynamic measures of collective efficacy.

150 **Dynamic Measurements Through Observations: The OCESS**

151 While striving toward a more dynamic measurement of collective efficacy, researchers
152 have experienced a practical barrier; in team sports it is not possible to interrupt a player
153 repeatedly during a game to measure his or her collective efficacy beliefs (Myers, Paiement,
154 & Feltz, 2007). Therefore, Edmonds and colleagues (2009) only considered a few time points
155 during a contest. However, in order to advance the knowledge of the dynamic character of
156 collective efficacy, one should strive for more frequent measurements throughout the game.
157 Because working with questionnaires appears to be a major barrier for realizing a continuous
158 measurement of collective efficacy during a contest, observations could provide a viable
159 alternative.

160 A first step toward an observational measure of collective efficacy was taken by
161 Fransen and colleagues (2012). These authors surveyed 33 top-level volleyball coaches on
162 what they believed to be the most important sources of team outcome confidence (i.e., “I
163 believe that my team will win the game”) in their sport. Subsequently, 2365 volleyball
164 coaches and athletes evaluated the extent to which these sources had the power to predict
165 team outcome confidence. The data revealed five sources that were perceived as very

166 important by both coaches and athletes: a) reacting enthusiastically when making a point; b)
167 having leader figures in the team who believe that their team will win this game and express
168 this on the court; c) having both players in the game and on the bench who cheer
169 enthusiastically; d) encouraging each other during the game; and e) communicating tactically
170 during the game. All these behaviors are clearly process-oriented. Having confidence that the
171 own team has the qualities to succeed in these five behaviors could therefore represent
172 process-oriented collective efficacy.

173 In the present study we develop a new scale based on these five sources, named the
174 Observational Collective Efficacy Scale for Sports (OCESS). The aim of the present study is
175 to assess whether this short scale constitutes a valid measure of process-oriented collective
176 efficacy in different team sports. If it does, the 5-item OCESS would offer a valid alternative
177 to the 20-item CEQS for assessing collective efficacy in sport whenever time available for
178 administering long questionnaires is limited. Furthermore, because all five items represent
179 observable behaviors, the OCESS would allow future assessment of the evolution of players'
180 collective efficacy beliefs throughout a contest by observations rather than questionnaires.
181 Such a measure could highlight the dynamic nature of collective efficacy during a game and
182 provide more insight into how to attain and maintain high collective efficacy.

183 **Hypotheses**

184 Given the ambiguity in the existing literature concerning the assessment of collective
185 efficacy, the main purpose of the present study is to investigate the validity of the measures
186 currently used to assess collective efficacy in sports teams. In line with our conceptual
187 reasoning above, we hypothesize that the Ability subscale assesses outcome-oriented team
188 confidence (analogous to the outcome-oriented one-item measures), rather than process-
189 oriented collective efficacy. By contrast, we expect the other four subscales of the CEQS to

190 form a valid and reliable reference measurement of process-oriented collective efficacy as
191 defined by Bandura (1997).

192 Once a reliable reference measurement of collective efficacy is obtained, a second aim
193 of our study can be realized: the validation of our newly developed five-item scale of
194 collective efficacy (Observational Collective Efficacy Scale for Sports; OCESS) within
195 different team sports. Two hypotheses can be formulated with regard to this aim. First, we
196 hypothesize that the OCESS and the CEQS (subscales 2-5) are strongly correlated (i.e., $r >$
197 $.70$), attesting that the OCESS measures process-oriented collective efficacy instead of
198 outcome-oriented team confidence. Second, the convergent and divergent validity of the
199 OCESS is examined by comparing the influence of demographic characteristics respectively
200 with the first subscale and the last four subscales of the CEQS. If supported, this OCESS,
201 which includes only observable behaviors, offers a starting point for the design of a
202 continuous measure of players' collective efficacy beliefs during the game through
203 observation instead of through the use of traditional questionnaires.

204 **Method**

205 **Procedure**

206 The database of the Flemish Trainer School (i.e., organization responsible for sport-
207 specific schooling of coaches in Flanders) was used to invite 5,535 qualified coaches out of
208 nine different team sports to participate in our study. These coaches were asked to complete a
209 web-based questionnaire and to motivate their players to complete the player-specific version
210 of the questionnaire. In order to assure variability within our sample, we also contacted non-
211 qualified coaches and their teams through the different Flemish sport federations. The coaches
212 and players who did not respond were sent a reminder two weeks later. Informed consent was
213 obtained from all participants. No rewards were given for participation in our study and all
214 participants were guaranteed full confidentiality.

215 **Participants**

216 In total, 4,451 participants (3,193 players and 1,258 coaches) completed our
217 questionnaire. This corresponds to an approximate response rate of 27%. These participants
218 played or coached in 2,366 different teams. More detailed information on the participants can
219 be found in Table 1. The sample included participants from nine team sports in Flanders;
220 basketball, handball, hockey, ice hockey, netball, rugby, soccer, volleyball, and water polo.
221 Table 2 contains the descriptive characteristics for the respondents of each of the nine team
222 sports. Data from this sample have been used in another research study (Fransen,
223 Vanbeselaere, De Cuyper, Vande Broek, & Boen, 2014), but examined different variables and
224 research questions.

225 **Measures**

226 **Collective efficacy.** Two measures of collective efficacy were included in our
227 questionnaire. First, the Collective Efficacy Questionnaire for Sports (CEQS; Short, et al.,
228 2005), including five subscales, each consisting of four items. In line with the suggestions of
229 Myers and Feltz (2007), each of the items begins with the stem: “Rate your confidence, in
230 terms of the upcoming game or competition, that your team has the ability to...” Participants
231 assessed the items on a 7-point scale anchored by 1 (*not at all confident*) and 7 (*extremely*
232 *confident*).

233 The second collective efficacy measure included in our study was our newly
234 developed five-item Observational Collective Efficacy Scale for Sports (OCESS), including
235 the most important sources of team outcome confidence (Fransen, et al., 2012). It is important
236 to note that, although the items of the OCESS are intended to be used as an observational
237 measurement instrument in the future, in the current study, the scale is still in a self-evaluative
238 questionnaire form. The items included in the OCESS are “react enthusiastically when
239 making a point,” “have leader figures in the team who believe that we will win this game and

240 express this on the court,” “have both players in the game and on the bench who cheer
241 enthusiastically,” “encourage each other during the game,” and “communicate a lot tactically
242 during the game.” In analogy with the CEQS, each of the items was assessed on a 7-point
243 scale ranging from 1 (*not at all confident*) to 7 (*extremely confident*) and each item began with
244 the stem: “Rate your confidence, in terms of the upcoming game or competition, that your
245 team has the ability to...”

246 **Team outcome confidence.** Outcome-oriented team confidence was measured using
247 five one-item measures that assess the confidence that the team will win the game, lose the
248 game, or realize its goals. These items are a general representation of the measures mainly
249 used in previous research studies (Myers & Feltz, 2007, for a review). To determine the
250 difference between an individual stem (i.e., “*I believe that our team...*”) and the team-focused
251 stem (i.e., “*Our team believes that we...*”), we included items with both stems for the
252 confidence in winning or losing the upcoming game.

253 **Other measures.** Besides several background characteristics (e.g., sex, age, years of
254 experience), we assessed some performance related measures as well, such as position of the
255 team in the ranking of the ongoing season and the score and quality of the play during the last
256 game.

257 **Results**

258 In order to validate our new OCESS scale as a measure of collective efficacy in sports
259 teams, we first investigated the validity of the measures currently used to assess collective
260 efficacy for the Flemish context.

261 **Investigation of the Validity of the Flemish Version of the Collective Efficacy**

262 **Questionnaire for Sports (CEQS)**

263 **Factor analyses.** A Confirmatory Factor Analysis (CFA) conducted on the 20-item
264 CEQS questionnaire, including the five subscales, for all 4,451 players and coaches, revealed

265 an inadequate fit with the data ($\chi^2 = 5620$; $df = 165$; $p < .001$; $GFI = .87$; $AGFI = .84$; $RMSEA$
266 $= .09$). We therefore conducted an Exploratory Factor Analysis on the whole sample (4,451
267 players and coaches within all sports) to identify the structure underneath the 20 items of the
268 CEQS scale. It has been established that the scree plot is a reliable criterion for component
269 selection with samples of more than two hundred participants (Stevens, 2002). The scree plot
270 suggested that two independent factors should be extracted which explained 61% of variance.
271 An item was retained to construct a factor when it had a minimum loading of .40, without
272 having a cross loading higher than .40 on another factor. This resulted in the deletion of three
273 items from different subscales; the items “Be ready” and “Devise a successful strategy” were
274 deleted from the subscale Preparation, the item “Perform under pressure” was deleted from
275 the subscale “Persistence”. The first component, accounting for 52% of the variance in
276 participants’ responses, consisted of 13 items from the subscales of Effort, Persistence,
277 Preparation, and Unity. The second component included the four items of the CEQS subscale
278 of Ability.

279 **Intercorrelations between the subscales of the CEQS.** In order to provide a better
280 insight into the underlying structure of the five subscales of the original CEQS, Table 3
281 presents the correlation matrix of all subscales of the CEQS scale. Cronbach’s α coefficients
282 are provided in parentheses on the diagonal as estimates of internal consistency.

283 The internal consistency of all five subscales was high (all Cronbach’s α ’s $> .83$). As
284 can be seen in Table 3, subscales 2, 3, 4, and 5 are strongly correlated (all $r > .69$). However,
285 the Ability subscale is only moderately correlated (i.e., $r < .60$) with the other subscales. This
286 confirms the previous EFA that this subscale measures something different than the other
287 subscales.

288 **The relation between CEQS and outcome-oriented team confidence.** To
289 investigate the internal validity of the different subscales of the CEQS we explore the

290 relationship with five one-item measures of outcome-oriented team confidence. Table 4
291 presents all correlations between these five one-item measures and the five subscales of the
292 CEQS (Short, et al., 2005).

293 The outcome-oriented beliefs (i.e., winning/losing the game) correlate strongly with
294 the Ability subscale. Also, the item assessing the belief in obtaining a goal correlates more
295 strongly with the Ability subscale than with the other four subscales. The subscales Effort,
296 Persistence, Preparation, and Unity correlate only moderately with outcome-oriented team
297 confidence (all $r < .49$). The internal consistency of this newly constructed scale (subscales 2-
298 5 of the CEQS) is very high (Cronbach's $\alpha = .95$). Additional analyses revealed high
299 correlation between the items: "I believe that our team will win the game" and "Our team
300 believes that we will win the game" ($r = .80$; $p < 0.01$).

301 **The Observational Collective Efficacy Scale for Sports (OCESS)**

302 The findings above make clear that the subscales Effort, Persistence, Preparation, and
303 Unity of the CEQS form a reliable measure of process-oriented collective efficacy. This
304 brings us to the second purpose of our study, namely to determine whether our newly
305 developed five-item OCESS can be considered as an adequate measure for process-oriented
306 collective efficacy. The Cronbach's α of the 5-item OCESS is .85, indicating a high internal
307 consistency.

308 **Correlation with CEQS.** Table 5 shows the correlations between the OCESS and the
309 CEQS, including correlations with the full scale as well as correlations with the different
310 subscales. In addition, the correlation with the process-oriented part of the CEQS (subscales
311 2-5) is reported. The results reveal high correlations between the OCESS and CEQS subscales
312 2, 3, 4, and 5, which together represent the process-oriented part of the CEQS ($r = .79$). In
313 contrast, only a moderate correlation with the CEQS Ability subscale emerged.

314 **Relation with demographic variables.** In order to further test the validity of the
315 OCESS as measure of collective efficacy, we explored both convergent and discriminant
316 validity by comparing the influence of demographic variables on different scales. With regard
317 to the convergent validity, we tested whether the OCESS and the process-oriented part of the
318 CEQS (subscales 2-5) are similarly related with the demographic variables. To examine the
319 discriminant validity, we tested whether the OCESS and the first subscale of the CEQS (as
320 measure of the outcome-oriented team confidence) are related with the predictors in a
321 different way.

322 We conducted three regression analyses with the different demographic variables as
323 predictors (see Table 6). The Ability subscale of the CEQS (presumably a measure of team
324 outcome confidence), the process-oriented part of the CEQS (subscales 2-5), and the newly
325 developed OCESS served as criterion variables. Because the large sample size ($N = 4450$)
326 goes along with an extremely high statistical power, we will consider only the significant
327 relationships with a β -value above .20 (explaining at least 4% of the variance). The regression
328 analyses in Table 6 reveal that the different demographic characteristics have a very similar
329 relation with the two criteria that we consider as measures of collective efficacy (i.e.,
330 subscales 2-5 of the CEQS and the OCESS). Both the place in ranking of the own team and
331 the playing level of the own team in the game of last weekend are significantly, and in the
332 same direction, related with the two collective efficacy scales, which supports the convergent
333 validity of our OCESS scale. By contrast, two different demographic variables, namely the
334 place in the ranking of the next game's opponent and the score of the first game against that
335 opponent, were significantly related to outcome-oriented team confidence. This differential
336 impact of demographic variables supports the discriminant validity of the OCESS scale.

337

338

339
340
341
342
343
344
345
346

Discussion

The results of the present study question the internal validity of the measures currently used to assess collective efficacy. Two types of measures could be distinguished: process-oriented collective efficacy (i.e., the confidence in the team's skills to accomplish the processes that could lead to successes) and outcome-oriented team confidence (i.e., the confidence in the team's ability to obtain a goal or win a game). Furthermore, our findings provide support for our contention that the developed five-item OCESS can be used as a valid measure of process-oriented collective efficacy.

347
348
349
350
351
352
353
354
355
356

First, the results of this study demonstrated that the internal consistency of each of the five subscales of the Collective Efficacy Questionnaire for Sports (Short, et al., 2005), as well as the internal consistency of the full scale, was high. On the other hand, the originally proposed five-factor structure showed only a moderate fit to the data. The Ability subscale emerged as a separate factor with relatively lower correlations with the other subscales, and with different relations with the demographic variables. This Ability subscale was found to assess outcome-oriented team confidence, rather than process-related collective efficacy, given its high correlations with the outcome-oriented one-item measures. The combined subscales Effort, Persistence, Preparation, and Unity seem to constitute a measure for process-related collective efficacy. Both findings are in line with our hypothesis.

357
358
359
360
361
362
363

Second, the present findings suggest that the OCESS is a valid measure of process-oriented collective efficacy in different team sports. First, the OCESS scale has a high internal consistency. Second, high correlations have been established with the four subscales of the CEQS that assess process-oriented collective efficacy ($r > .68$). In contrast, only a moderate correlation emerged with the Ability subscale. This indicates that the OCESS is a measure of process-oriented collective efficacy rather than a measure of outcome-oriented team confidence. The convergent validity of the OCESS was further supported by the similar

364 relations between demographic characteristics and both the OCESS scale and the process-
365 oriented part of the CEQS. In contrast, these demographic characteristics had different
366 relations with the Ability subscale, supporting the discriminant validity, and providing further
367 evidence that the Ability subscale of the CEQS does not measure process-oriented collective
368 efficacy beliefs that are congruent with Bandura's (1997) definition of the construct.

369 In addition, in this original definition, Bandura (1997) referred to collective efficacy as
370 "a group's shared belief". Nevertheless, previous research argued that the best way to capture
371 efficacy beliefs in questionnaires is by assessing the individual's perception of the team's
372 capabilities (Bandura, 1997; Myers & Feltz, 2007; Shearer, Holmes, & Mellalieu, 2009). It
373 should be noted that the OCESS contains items that express interaction or interpersonal
374 behavior (e.g., communicating tactically, encouraging each other). These behaviors can be
375 interpreted as "shared" behavior, and therefore align more closely with the original definition
376 of Bandura (1997).

377 Because all the items in the OCESS refer to behaviors that can be observed, this scale
378 offers a starting point for the development of a continuous observational instrument of
379 collective efficacy during a competitive game. Because this new measure of collective
380 efficacy can be completed by observers, it has the potential to overcome the limitations of
381 traditional questionnaires that have to be completed by the players themselves. Moreover,
382 such observations allow assessing the dynamical changes of collective efficacy (e.g., in
383 critical periods during a game).

384 Our study includes strengths and limitations, so the results should be interpreted
385 accordingly. A particular strength of the study is the large sample size of both coaches and
386 athletes, as well as the diversity of sport and competition level. Having such a large and
387 diverse sample increases the applicability of the results to various sport settings. In addition,

388 the five-item OCESS offers a valid alternative to one-item measures for assessing collective
389 efficacy in sport whenever time available for administering long questionnaires is limited.

390 A potential limitation associated with our study is the use of an online survey to gather
391 the data, which resulted in participation of individual players and coaches rather than
392 complete teams. Because the 4,451 participants were active in 2,366 different teams, it was
393 not possible to establish whether these collective efficacy beliefs are shared within the team.
394 Collective efficacy is a group-level construct that is typically measured at the individual level
395 and then, when appropriate, aggregated to the group or team level for subsequent analysis.
396 This study only measured collective efficacy beliefs at the individual level of analysis. Further
397 research is required to explore whether a similar pattern will be obtained at the group-level of
398 analysis.

399 A second limitation regards to the design of our study. Given our cross-sectional study
400 design, we are not able to give evidence for the amount of stability or instability of the
401 OCESS over time. Because the OCESS (in an observational form) should be able to capture
402 changes in collective efficacy (e.g., during a game or between subsequent games), the
403 measurement has to be sensitive for variations. On the other hand, given the stability of
404 external and internal circumstances, we expect high test-retest-reliability. More clarity should
405 be obtained with further studies.

406 Another suggestion for future research refers to the validation of the OCESS as
407 observational measure of collective efficacy. The present manuscript provides the first
408 necessary step in this validation process by demonstrating that the *self-reported* efficacy
409 behaviors (i.e., the OCESS) are highly correlated with collective efficacy, as measured by the
410 process-oriented part of the CEQS. Future work is required to complete the final step in this
411 validation process, namely to establish a high correlation between the *self-reported* efficacy
412 behaviors and the *observer-reported* efficacy behaviors in a real game setting (both assessed

413 by the OCESS). To obtain a high inter-observer reliability, it will be essential to define and
414 standardize the observation of the five behaviors for each specific sport, as well as to train the
415 observers in this behavioral assessment.

416 The findings of the present study contribute both to theoretical knowledge and to
417 coaching practice. First, the results provide clear insight into the conceptual distinction
418 between process-oriented collective efficacy and outcome-oriented team outcome confidence.
419 Hopefully, these findings result in more conceptual clarity in future collective efficacy
420 research. Furthermore, these findings have the potential to provide the basis for the
421 development of a dynamic collective efficacy measurement based on observations guided by
422 the OCESS. Such a measure could provide a better insight in the dynamic nature of collective
423 efficacy during a game and its relation with performance.

424 Second, this continuous measure would constitute an added value for the coaching
425 practice by providing coaches with more insights into how to attain and maintain high
426 collective efficacy standards within their teams. In addition to technical and tactical scouting,
427 this mental scouting of players can become an essential tool to make important decisions in
428 the course of a game.

429

References

- 430 Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- 431 Chen, G., Webber, S. S., Bliese, P. D., Mathieu, J. E., Payne, S. C., Born, D. H., & Zaccaro,
432 S. J. (2002). Simultaneous examination of the antecedents and consequences of
433 efficacy beliefs at multiple levels of analysis. *Human Performance, 15*(4), 381-409.
- 434 Collins, C. G., & Parker, S. K. (2010). Team capability beliefs over time: Distinguishing
435 between team potency, team outcome efficacy, and team process efficacy. *Journal of*
436 *Occupational and Organizational Psychology, 83*(4), 1003-1023. doi:
437 10.1348/096317909x484271
- 438 Dithurbide, L., & Feltz, D. L. (2012). Self-efficacy and collective efficacy. In G. Tenenbaum,
439 R. C. Eklund & A. Kamata (Eds.), *Measurement in sport and exercise psychology* (pp.
440 251-263). Champaign, IL: Human Kinetics.
- 441 Dithurbide, L., Sullivan, P., & Chow, G. (2009). Examining the influence of team-referent
442 causal attributions and team performance on collective efficacy: A multilevel analysis.
443 *Small Group Research, 40*(5), 491-507. doi: 10.1177/1046496409340328
- 444 Edmonds, W. A., Tenenbaum, G., Kamata, A., & Johnson, M. B. (2009). The role of
445 collective efficacy in adventure racing teams. *Small Group Research, 40*(2), 163-180.
446 doi: 10.1177/1046496408328489
- 447 Fransen, K., Vanbeselaere, N., Exadaktylos, V., Vande Broek, G., De Cuyper, B., Berckmans,
448 D., . . . Boen, F. (2012). "Yes, we can!": Perceptions of collective efficacy sources in
449 volleyball. *Journal of Sports Sciences, 30*(7), 641-649. doi:
450 10.1080/02640414.2011.653579
- 451 Fransen, K., Vanbeselaere, N., De Cuyper, B., Vande Broek, G., & Boen, F. (2014). The myth
452 of the team captain as principal leader: Extending the athlete leadership classification

- 453 within sport teams. *Journal of Sports Sciences*, 1-9. doi:
454 10.1080/02640414.2014.891291
- 455 Greenlees, I. A., Graydon, J. K., & Maynard, I. W. (1999). The impact of collective efficacy
456 beliefs on effort and persistence in a group task. *Journal of Sports Sciences*, 17(2),
457 151-158.
- 458 Hodges, L., & Carron, A. V. (1992). Collective efficacy and group performance. *International*
459 *Journal of Sport Psychology*, 23(1), 48-59.
- 460 Keshtan, M. H., Ramzaninezhad, R., Kordshooli, S. S., & Panahi, P. M. (2010). The
461 relationship between collective efficacy and coaching behaviors in professional
462 volleyball league of Iran clubs. *World Journal of Sport Sciences*, 3(1), 1-6.
- 463 Mangan, A. (2013, April 5). Have Arsenal found confidence at the right time? Retrieved
464 from <http://espnfc.com>
- 465 Myers, N. D., & Feltz, D. L. (2007). From self-efficacy to collective efficacy in sport:
466 Transitional methodological issues. In G. Tenenbaum & R. C. Eklund (Eds.),
467 *Handbook of sport psychology* (3rd ed., pp. 799-819). Hoboken, NJ, US: John Wiley
468 & Sons Inc.
- 469 Myers, N. D., Feltz, D. L., & Short, S. E. (2004). Collective efficacy and team performance:
470 A longitudinal study of collegiate football teams. *Group Dynamics: Theory, Research,*
471 *and Practice*, 8(2), 126-138. doi: 10.1037/1089-2699.8.2.126
- 472 Myers, N. D., Paiement, C. A., & Feltz, D. L. (2007). Regression team performance on
473 collective efficacy: Considerations of temporal proximity and concordance.
474 *Measurement in Physical Education and Exercise Science*, 11(1), 1-24.
- 475 Myers, N. D., Payment, C. A., & Feltz, D. L. (2004). Reciprocal relationships between
476 collective efficacy and team performance in women's ice hockey. *Group Dynamics:*
477 *Theory, Research, and Practice*, 8(3), 182-195. doi: 10.1037/1089-2699.8.3.182

- 478 Shearer, D. A., Holmes, P., & Mellalieu, S. D. (2009). Collective efficacy in sport: the future
479 from a social neuroscience perspective. *International Review of Sport and Exercise*
480 *Psychology*, 2(1), 38-53. doi: 10.1080/17509840802695816
- 481 Short, S. E., Sullivan, P., & Feltz, D. (2005). Development and preliminary validation of the
482 collective efficacy questionnaire for sports. *Measurement in Physical Education and*
483 *Exercise Science*, 9(3), 181-202.
- 484 Silver, W. S., & Bufanio, K. M. (1996). The impact of group efficacy and group goals on
485 group task performance. *Small Group Research*, 27(3), 347-359.
- 486 Spink, K. S. (1990). Group cohesion and collective efficacy of volleyball teams. *Journal of*
487 *Sport & Exercise Psychology*, 12(3), 301-311.
- 488 Stevens, J. (2002). *Applied multivariate statistics for the social sciences* (4th ed.). Hillsdale,
489 NJ: Erlbaum.
- 490 Tasa, K., Taggar, S., & Seijts, G. H. (2007). The development of collective efficacy in teams:
491 A multilevel and longitudinal perspective. *Journal of Applied Psychology*, 92(1), 17-
492 27. doi: 10.1037/0021-9010.92.1.17
- 493 Vargas-Tonsing, T. M., & Bartholomew, J. B. (2006). An exploratory study of the effects of
494 pregame speeches on team efficacy beliefs. *Journal of Applied Social Psychology*,
495 36(4), 918-933.

496 **Table 1**497 *Sample characteristics*

	Participants	M_{Age} (years)	$M_{Experience}$ (years)	Team gender	Level
Coaches	1,258 (28%)	41.94	13.97	905 ♂ (72%) 353 ♀ (28%)	90 E (7%) 268 N (21%) 613 P (49%) 102 RG (8%) 22 RC (2%) 163 Y (13%)
Players	3,193 (72%)	23.92	14.21	1,915 ♂ (60%) 1,278 ♀ (40%)	177 E (6%) 836 N (26%) 1,733 P (54%) 209 RG (7%) 122 RC (4%) 116 Y (4%)
Total sample	4,451	29.01	14.14	2,820 ♂ (63%) 1,631 ♀ (37%)	267 E (6%) 1,104 N (25%) 2,346 P (53%) 311 RG (7%) 144 RC (3%) 279 Y (6%)

498 *Note.* ♂ = male; ♀ = female; E = elite level; N = national level; P = provincial level; RG =
 499 regional level; RC = recreational level; Y = youth teams.

500 **Table 2**501 *Sport specific sample characteristics*

	Participants	M_{age} (years)	$M_{Experience}$ (years)	Male team (♂) / Female team (♀)	Function Players (P) / Coaches (C)
Basketball	1,959 (44%)	27.40	14.67	1,332 ♂ (68%) 627 ♀ (32%)	1,551 P (79%) 408 C (21%)
Volleyball	1,287 (29%)	29.77	14.35	521 ♂ (41%) 766 ♀ (59%)	919 P (71%) 368 C (29%)
Soccer	589 (13%)	33.88	13.05	541 ♂ (92%) 48 ♀ (8%)	249 P (42%) 340 C (58%)
Hockey	127 (3%)	27.39	13.65	68 ♂ (53%) 59 ♀ (47%)	110 P (87%) 17 C (13%)
Netball	118 (3%)	27.53	15.27	64 ♂ (54%) 54 ♀ (46%)	85 P (72%) 33 C (28%)
Handball	116 (3%)	29.64	13.67	80 ♂ (69%) 36 ♀ (31%)	76 P (65%) 40 C (35%)
Water polo	99 (2%)	26.93	13.40	84 ♂ (85%) 15 ♀ (15%)	84 P (85%) 15 C (15%)
Rugby	84 (2%)	28.10	7.59	67 ♂ (80%) 17 ♀ (20%)	60 P (71%) 24 C (29%)
Ice hockey	72 (2%)	27.76	13.37	63 ♂ (87%) 9 ♀ (13%)	59 P (82%) 13 C (18%)
Total sample	4,451	29.01	14.14	2,820 ♂ (63%) 1,631 ♀ (37%)	3,193 P (72%) 1,258 C (28%)

502

503 **Table 3**504 *Intercorrelations between different subscales of the CEQS (Short et al., 2005). The*505 *Cronbach's α coefficient of each subscale can be found on the diagonal in parentheses.*

	Subscale 1	Subscale 2	Subscale 3	Subscale 4	Subscale 5
	Ability	Effort	Persistence	Preparation	Unity
Subscale 1 Ability	(.93)				
Subscale 2 Effort	.51**	(.83)			
Subscale 3 Persistence	.56**	.79**	(.83)		
Subscale 4 Preparation	.59**	.75**	.69**	(.84)	
Subscale 5 Unity	.52**	.80**	.79**	.73**	(.84)

506 ** $p < .01$

507 **Table 4**

508 *Correlations between the subscales of the CEQS and five one-item measures of outcome-*
 509 *oriented team confidence*

	Subscale 1	Subscale 2	Subscale 3	Subscale 4	Subscale 5
	Ability	Effort	Persistence	Preparation	Unity
I believe that our team will win the upcoming game	.77**	.37**	.40**	.44**	.38**
I believe that our team will lose the upcoming game	-.73**	-.34**	-.37**	-.41**	-.35**
I believe that our team will obtain its goal in the upcoming game	.59**	.47**	.48**	.49**	.49**
Our team believes that we will win the upcoming game	.75**	.40**	.44**	.48**	.41**
Our team believes that we will lose the upcoming game	-.69**	-.35**	-.39**	-.43**	-.36**

510 ** $p < .01$

511 **Table 5**512 *The correlations between the five-item OCESS (both full scale and individual items) and the*513 *CEQS (Short et al., 2005)*

	Full	S1	S2	S3	S4	S5	S2-5
	CEQS	Ability	Effort	Persistence	Preparation	Unity	
Full OCESS	.78**	.51**	.75**	.68**	.68**	.75**	.79**
1. React enthusiastically when making a point	.51**	.27**	.55**	.45**	.46**	.50**	.54**
2. Have leader figures in the team who believe that we will win this game and express this on the court	.62**	.51**	.56**	.52**	.52**	.55**	.59**
3. Have both players in the game and on the bench who cheer enthusiastically	.61**	.37**	.62**	.56**	.51**	.60**	.63**
4. Encourage each other during the game	.64**	.36**	.64**	.57**	.53**	.65**	.66**
5. Communicate a lot tactically during the game	.66**	.45**	.57**	.57**	.64**	.63**	.67**

514 ** $p < .01$

515 **Table 6**

516 *Regression analyses with background characteristics as predictors and CEQS and OCESS as*
 517 *dependent variables. The significant beta values are marked in bold.*

Predictors	CEQS	CEQS	OCESS
	Subscale 1	Subscale 2-5	
	Team outcome confidence	Collective efficacy	Collective efficacy
	$R^2 = .391$	$R^2 = .180$	$R^2 = .130$
	β	β	β
Player/Coach	.06*	.13***	.04
Sex	.03	-.06	-.10**
Male/Female team	.01	.04	.05
Age	-.04	.02	.03
Years of experience	.01	.01	-.02
Team level	-.04**	-.10***	-.05**
Team tenure	.02	.05**	.06**
Place in ranking of own team	-.18***	-.25***	-.25***
Place in ranking of opponent	-.33***	-.07**	-.02
Score of first game against same opponent	.20***	-.00	.00
Score of game last weekend	.03	-.01	-.00
Ranking opponent of game last weekend	.04*	-.02	.00
Playing level own team game last weekend	.10***	.23***	.20***

518 * $p < .05$ ** $p < .01$ *** $p < .001$