1   Psychometric Properties of an

2   Italian Version of the Collective Efficacy Questionnaire for Sports

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1   Abstract

2   The Collective Efficacy Questionnaire for Sports (CEQS; Short, Sullivan, & Feltz, 2005) is a

3   domain-specific instrument for the assessment of collective efficacy across interdependent

4   team sports. This study evaluated the psychometric properties of an Italian version of the

5   CEQS (CEQS-Ita) with 306 athletes. The instrument showed a good level of internal

6   consistency reliability. Construct validity was demonstrated by examining the factor

7   structure, and convergent and discriminant properties of the instrument. Confirmatory Factor

8   Analyses suggested a model with four sub-dimensions: ability, determination, preparation,

9   and unity. Convergent properties of the instrument were demonstrated through positive

10 correlations with all four components of an Italian version of the Group Environment

11 Questionnaire (GEQ; Andreaggi, Robazza, & Bortoli, 2000). Discriminant validity was

12 evidenced by the absence of correlation with cognitive or somatic anxiety measured through

13 an Italian version of the Revised Competitive State Anxiety Inventory-2 (Martinengo,

14 Bobbio, & Marino, 2012).

15   *Keywords:* collective efficacy, measurement translation, construct validity, internal

16   structure, factor structure.

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1   Psychometric Properties of an Italian Version of the Collective Efficacy Questionnaire for

2   Sports

3   The performance of interdependent sports teams is positively related to the team

4   members' collective efficacy perceptions (Beauchamp, 2007). Over the past two decades

5   studies in sport have adopted two popular definitions of collective efficacy (Myers & Feltz,

6   2007). The first describes collective efficacy as "a group's shared belief in its conjoint

7   capabilities to organize and execute the courses of action required to produce given levels of

8   attainments" (Bandura, 1997, p. 477). The second refers to collective efficacy as "a sense of

9   collective competence shared among individuals, when allocating, coordinating and

10   integrating their resources in a successful concerted response to specific situational demands"

11   (Zaccaro, Blair, Peterson, & Zazanis, 1995, p. 309). The presence of different definitions for

12   this construct represents a limitation in the existing literature, hindering the development of

13   tools to assess collective efficacy (Maddux, 1999). In order to develop a valid assessment

14   tool, it is necessary to be clear on what constitutes the construct that is intended to be

15   measured (DeVellis, 2003; McKenzie, Podsakoff, & Podsakoff, 2011). As team sports

16   performance is underpinned by the achievement of specific goals (e.g., shots on target in

17   soccer) rather than success in general, we have chosen to adopt Bandura's definition of

18   collective efficacy and follow his subsequent guidelines (Bandura, 2006) for the assessment

19   of collective efficacy beliefs in this study. This decision aligns with the sport-based literature

20   that has explored collective efficacy, enabling cross-comparison of findings with existing and

21   future studies in this setting (see e.g., Bruton, Mellalieu, & Shearer, 2014; Greenlees, Nunn,

22   Graydon, & Maynard, 1999; Shearer, Holmes, & Mellalieu, 2009).

23   Collective efficacy is rooted in self-efficacy, which refers to an individual's belief in

24   her/his capabilities to perform a specific task (Bandura, 1997). Sources contributing to the

25   development of self-efficacy remain consistent for collective efficacy (mastery experiences,

1   vicarious experience, verbal persuasion, and physiological/affective states), with the addition

2   of leadership, cohesion and group size specific to collective efficacy (Carron & Hausenblas,

3   1998). In sport, most of the collective efficacy literature has considered its relationship with

4   team performance (e.g., Heuzé, Raimbault, & Fontaine, 2006; Myers, Feltz, & Short, 2004;

5   Myers, Payment, & Feltz, 2004). A reciprocal relationship has been found between the two,

6   with previous performance impacting collective efficacy levels, which subsequently influence

7   future team performance (Myers, Feltz, et al., 2004). Considerable research has also studied

8   collective efficacy in relation to other group constructs, such as team leadership and team

9   communication (see Zaccaro et al., 1995; Zaccaro, Rittman, & Marks, 2001). Collective

10   efficacy has consistently been shown to positively relate to the task components of group

11   cohesion, a popular group construct in team sports (e.g., Heuzé, Sarrazin, Masiero,

12   Raimbault, & Thomas, 2006; Kozub & McDonnel, 2000), suggesting that confident teams are

13   likely to remain united when seeking to achieve collective performance outcomes.

14   Research on collective efficacy in sport has included both controlled laboratory-based

15   and ecologically valid field-based studies (e.g., Bray, 2004; Bruton et al., 2014; Dithurbide,

16   Sullivan, & Chow, 2009; Feltz & Lirgg, 1998). Using laboratory-based designs, Bray (2004)

17   showed that group goals mediated the relationship between collective efficacy and

18   performance in a group task, while Bruton and colleagues (2014) demonstrated that team

19   members' perceptions of collective efficacy can be increased using video-based observation

20   interventions with positive group content. Studies adopting a field-based longitudinal design

21   during a competitive season have demonstrated a positive relationship between collective

22   efficacy and team performance for volleyball (Dithurbide et al., 2009), American football

23   (Myers, Feltz et al., 2004), and ice hockey (Feltz & Lirgg, 1998).

24   A further issue surrounding collective efficacy concerns the level at which the construct

25   has been measured, with studies examining collective efficacy at both an individual (e.g.,

1   Heuzé, Sarrazin, et al., 2006) and team level (e.g., Gibson, 1999). Bandura (1997) suggests

2   that individual team members' confidence in the team's capabilities should be assessed, and

3   these individual beliefs should be aggregated to the team level. Consequently, studies in sport

4   have operationalized and measured collective efficacy in four ways (cf. Lindsey, Brass, &

5   Thomas, 1995). The first approach (CE-SE, collective efficacy based on self-efficacy

6   responses), aggregates individual responses to self-efficacy items, the second (CE-CEI,

7   collective efficacy based on individual perceptions of collective efficacy) aggregates

8   individual assessments of their confidence in their team, the third (CE-CET, where T stands

9   for team) aggregates individual perceptions of their team's confidence in themselves, and the

10   fourth (CE-GCE, collective efficacy based on group discussion about the team's collective

11   efficacy) uses a group discussion to obtain a single estimate of collective efficacy (Myers &

12   Feltz, 2007). Of these operational methods CE-CEI and CE-CET approaches have received

13   most use in sport literature. For example, Paskevich and colleagues (Paskevich, Brawley,

14   Dorsch, & Widmeyer, 1999) employed the CE-CET approach to measure collective efficacy

15   with volleyball players (item e.g., "our team's confidence that we can spike from the left side

16   of the court is…"), while Magyar, Feltz, and Simpson (2004) used the CE-CEI approach to

17   assess collective efficacy beliefs in rowing teams (item e.g., "how confident are you that your

18   crew can settle into the race?"). Given that collective efficacy is generally measured through

19   individual cognitions, we consider it appropriate to measure this construct at the individual-

20   level using the CE-CET approach as it recognizes the unique characteristics of each team

21   member and does not assume that one global method will work for all team members (cf.

22   Bruton et al., 2014; Bruton, Mellalieu, & Shearer, 2016).

23   As the study of collective efficacy has increased in sport, multiple methods have been

24   developed to assess this construct. Studies have employed sport-specific collective efficacy

25   questionnaires that measure skills or actions that encapsulate overall performance in team

1 sports such as rugby union (Kozub & McDonnel, 2000) and ice hockey (Myers, Payment, et

2 al., 2004). Instruments that focus on a team's confidence for particular aspects of sport

3 performance have also been adopted. For example, Myers, Feltz and colleagues (2004)

4 developed a questionnaire that assessed American football player's confidence in their team's

5 capabilities to perform offensive actions in a competitive match. Such bespoke measures

6 allow for in-depth assessment of collective efficacy for a sport, but do not permit comparison

7 of findings between sports due to the sport-specific content included (Short, Sullivan, &

8 Feltz, 2005). For example, with a questionnaire specific to soccer it is possible to investigate

9 the players' belief in their team's ability to succeed in a corner kick set-piece, but this is not

10 possible in sports where this set-piece does not occur, such as in basketball or volleyball. A

11 sport-domain measure of collective efficacy allows for the potential comparison of efficacy

12 for aspects common to different team sports, such as the union of the group or their

13 persistence during performance (cf. Short et al., 2005).

14 Domain-specific instruments already exist for group-based psychological constructs in

15 sporting contexts. For example, the Group Environment Questionnaire (GEQ; Carron,

16 Widmeyer, & Brawley, 1985) assesses the cohesion of the group towards both task and social

17 aspects. In the sport literature, group cohesion, and in particular the group integration towards

18 the task, is reported to hold a positive relationship with collective efficacy (e.g., Heuzé,

19 Raimbault, et al., 2006; Heuzé, Sarrazin, et al., 2006; Kozub & McDonnel, 2000; Paskevich,

20 et al., 1999; Spink, 1990). Single-item instruments withstanding (e.g., Bruton et al., 2016),

21 the majority of questionnaires for collective efficacy explore multiple dimensions of the

22 construct. The Collective Efficacy Questionnaire for Sports (CEQS; Short et al., 2005) is a

23 multidimensional collective efficacy instrument which has been used across several coactive

24 and interdependent team sports, such as rugby union, hockey, soccer, volleyball, basketball,

1   water polo, swimming relay, and track and field relay teams, among others (see e.g., Bruton

2   et al., 2016; Dithurbide et al., 2009; Jowett, Shanmugam, & Caccoulis, 2012).

3   In its development, the CEQS was subject to rigorous psychometric assessment

4   procedures, including item generation, exploration of the factor structure, scale modification,

5   confirmation of the factor structure, and analysis of the correlations with the GEQ for the

6   assessment of construct validity (Short et al., 2005). The final model resulted in a 5-factor

7   first order structure where all the factors were correlated (model fit reported by authors:

8   X^2=574.3(160); $p < .001$; *CFI*=0.92; *NNFI*=0.90; *SRMR*=.04; *RMSEA*=.09 [90% CI=.087-

9   1.04]). The five dimensions of the scale were named: ability, effort, persistence, preparation,

10   unity. In the original study, the subdimensions of the CEQS and the composite score were

11   reported to have weak to moderate positive correlations with all the dimensions of the GEQ

12   (ranging from .20 to .57). Scores for the group integration toward the task (GI-T) dimension

13   showed the highest correlations with the CEQS sub-dimensions (ranging from .37 to .57),

14   with the 'unity' sub-dimension reporting the strongest positive correlation (.57). Since its

15   inception, the CEQS has been adapted for use in other languages, such as Japanese (Hochi,

16   Mizuno, & Nakayama, 2012), Greek (Jowett et al., 2012), Spanish (Martinez, Guillen, &

17   Feltz, 2011), and Turkish (Öncü, Feltz, Lirgg, & Gürbüz, 2018). Despite multiple translations

18   existing for this questionnaire, it has yet to be adapted for use with an Italian-speaking

19   population. Italy has approximately four and a half million athletes registered with sporting

20   federations and practicing sport at different competitive levels (CONI, 2014). This represents

21   a large population of interest for the study of group dynamics within sporting contexts, but at

22   present no domain-specific instrument exists for collective efficacy measurement in Italian

23   sports teams. Therefore, the present study aimed to examine the psychometric properties of

24   an Italian translation of the CEQS (CEQS-Ita) for use with Italian-speaking team sports

1 athletes, and to provide a cross-cultural validation of an instrument used for measuring

2 collective efficacy in sports.

3   To achieve this aim, we followed a number of guidelines for scale development and

4 refinement (AERA, APA, & NCME, 2014; DeVellis, 2003; MacKenzie, Podsakoff, &

5 Podsakoff, 2011; Tenenbaum, Eklund, & Kamata, 2012; Zumbo & Chan, 2014). As this

6 study aimed to examine the psychometric properties of an already existing and conceptually

7 grounded scale, our focus was on the confirmation of the factor structure and on the

8 examination of its convergent and discriminant properties. Confirmatory Factor Analysis

9 (CFA), an evaluation method for all new and existing measures in sport and exercise

10 psychology (Marsh, 2007), was used to assess the factor structure of the CEQS-Ita. To

11 explore the convergent properties of the CEQS-Ita, it is necessary to identify if scores for this

12 instrument are positively correlated with measurement scores for a similar construct (Martin,

13 Carron, Eys, & Loughead, 2013; Trochim, 2000). Cohesion and collective efficacy exhibit a

14 positive relationship (e.g., Heuzé, Raimbault et al., 2006), therefore, we examined the

15 correlations between an Italian version of the GEQ (Andreaggi, Robazza, & Bortoli, 2000)

16 and the CEQS-Ita, expecting to find that all four components of the GEQ would correlate

17 positively with sub-dimension and composite scores for the CEQS-Ita. To provide support for

18 the discriminant properties of the CEQS-Ita, it is necessary to identify if scores for this

19 instrument demonstrate a negative or zero correlation with a different construct (Martin et al.,

20 2013; Trochim, 2000). As collective efficacy is proposed to have a negative relationship with

21 cognitive anxiety and no relationship with somatic anxiety (Greenlees et al., 1999), we

22 explored the correlations between the CEQS-Ita and an Italian version of the Revised

23 Competitive State Anxiety Inventory-2 (Martinengo, Bobbio, & Marino, 2012). We

24 hypothesized that the cognitive anxiety and somatic anxiety subscale scores would be

25 negatively correlated and uncorrelated with CEQS-Ita scores, respectively.

1   **Method**

2   **Participants**

3   Three hundred and six athletes ($n = 205$ male, $n = 101$ female) with a mean age of

4   27.29 years ($SD = 7.15$) ranging between 18 and 56 were recruited for participation in this

5   study. Participants were sampled from 29 Italian sport teams and included players from:

6   baseball and softball ($n = 68$), basketball ($n = 56$), volleyball ($n = 52$), football ($n = 32$),

7   rugby ($n = 30$), handball ($n = 27$), water polo ($n = 23$), field hockey ($n = 18$). Athletes ranged

8   in ability from recreational to semi-professional and professional competitive levels.

9   Participants had an average of 12.03 years of experience in their own sport ($SD = 7.81$; range:

10   1-45 years), and 6.23 years' experience in their current team ($SD = 5.46$; range: 1-21 years).

11   With regards to the sample size, we adopted MacKenzie and colleagues' guidelines, which

12   suggest a minimum of 100-500 participants for scale validation studies, and a minimum ratio

13   between the number of respondents and the number of items of at least 3:1 (MacKenzie et al.,

14   2011). In the present study, the eventual ratio was 15:1 (306 respondents for 20 items).

15   **Measures**

16   **Collective efficacy.** Collective efficacy was measured through a translated version of

17   the CEQS (Short et al., 2005). The CEQS is a 20-item questionnaire consisting of five

18   factors: ability, effort, persistence, preparation, and unity. Ratings are made on a 10-point

19   likert scale ranging between 0 (not at all confident) and 9 (completely confident). Items from

20   the original (CEQS) and the Italian version (CEQS-Ita) are presented in Table 1. In line with

21   the development of the original scale (see Short et al., 2005), items were introduced by the

22   stem: "Rate your team's confidence, in terms of the upcoming competition, that your team

23   has the ability to…" (translated as *In riferimento alla prossima competizione, valuta la*

24   *fiducia della tua squadra riguardo al fatto che la squadra abbia la capacità di…*"). This

1 adopts a CE-CET approach to collective efficacy measurement whereby individuals are asked

2 to rate the team's confidence in themselves (see Lindsey et al., 1995).

3 **Group cohesion.** The Italian version of the Group Environment Questionnaire (GEQ;

4 Andreaggi et al., 2000) was utilized for the measurement of group cohesion. The GEQ

5 consists of 18 items and is made up of four components: individual attraction towards group's

6 social activities (ATG-S, 5 items); individual attraction towards group task (ATG-T, 4 items);

7 group integration on social aspects (GI-S, 4 items), group integration towards the task (GI-T,

8 5 items). Responses are made on a 9-point likert scale ranging between 1 (strongly disagree)

9 and 9 (strongly agree). Andreaggi et al.'s study reported mixed findings for the internal

10 reliability for each of the GEQ factors (α *range* = .59-.77), with acceptable to good alpha

11 values evident for the present study: ATG-S (α = .70), ATG-T (α = .61), GI-S (α = .71), GI-T

12 (α = .68).

13 **Precompetitive anxiety.** In order to evaluate athletes' cognitive and somatic anxiety,

14 we utilized two sub-scales from the Italian version of the Competitive State Anxiety

15 Inventory-2 revised (CSAI-2 revised; Martinengo et al., 2012). The sub-scales were

16 composed of 7 items for somatic anxiety and 5 items for cognitive anxiety. Responses were

17 provided on a 4-point likert scale ranging from 1 ("not at all") to 4 ("very much"). Good

18 Cronbach's alpha values for both subscales were found in the original study (α *range* = .78-

19 .84) as well as in the present investigation (α *range* = .81-.82).

20 **Procedure**

21 An initial translation of the CEQS into Italian language was made by the first and the

22 fourth authors of this study, both native Italian speakers competent in English and Italian lan-

23 guages. The questionnaire translation was checked by the first (native Italian speaker) and

24 second author (native English speaker) through a collaborative and iterative method (cf.

25 Douglas & Craig, 2007). This method mantains conceptual equivalence, overcoming the

1 biases of literal translation, a common pitfall associated with the back-translation method

2 (Douglas & Craig; Van de Vjier & Hambleton, 1996). For example, in the Spanish version of

3 the CEQS (Martinez et al., 2011), back-translation led to the mistranslation of an item. Spe-

4 cifically, "Stay in contention when it seems like your team isn't getting any breaks" became

5 "*Permanecer en el juego cuando parece que tu equipo no tiene descanso alguno*", which is

6 more similar to "Stay in contention when it seems like your team isn't getting any rest",

7 whereas the expression "getting a break" in English language does not literally mean "getting

8 a rest", but it is more related to a component of luck. The use of the collaborative and itera-

9 tive method allowed us to translate this item as "*Rimanere in gara anche quando sembra che*

10 *la propria squadra non abbia buone opportunità*", which is similar to "Stay in contention

11 when it seems like your team isn't getting any good opportunities", maintaining conceptual

12 equivalence.

13   Once translated, the CEQS-Ita was placed into a questionnaire pack along with a de-

14 mographic sheet and the Italian versions of the GEQ and somatic/cognitive anxiety subscales

15 from the CSAI-2 revised. An online version of the questionnaire pack was then created using

16 an online-survey provider (Qualtrics) and the administration procedure was entirely online.

17 Prior to recruitment, ethical permission to conduct the study was obtained from the institution

18 ethics committee of the first author. A preliminary study, using 10 athletes, confirmed the

19 clarity of the instructions and item-wording for the CEQS-Ita. An opportunity sampling

20 method was used to recruit a large sample of athletes via email in order to provide an accu-

21 rate representation of the Italian team sports population. The senior official at the club (i.e.,

22 coach, manager, president) was contacted directly, by phone or in person, provided with in-

23 formation on the study and asked to administer the online survey link to all members of their

24 team. Prior to completion of the online survey, study participants were informed that their in-

25 volvement was voluntary, there was no correct/incorrect answer to the questions presented,

1 and that answers would remain strictly confidential and securely stored on computers within

2 the university department of the research team. The online questionnaire pack took approxi-

3 mately fifteen minutes to complete.

4 **Data Analysis**

5   In order to prepare data for analysis, a listwise deletion approach was adopted. No

6 data transformation was performed on the data sample. Further data screening and

7 Cronbach's alpha analyses were performed using IBM SPSS 20.0. In line with recent

8 standards for test development (see AERA, APA, & NCME, 2014; Tenenbaum et al., 2012;

9 Zumbo & Chan, 2014), construct validity of the CEQS-Ita was explored through the

10 investigation of the internal factor structure of the questionnaire in combination with

11 convergent and discriminant evidence. Data was transferred onto IBM AMOS Graphic 20.0

12 and three Confirmatory Factor Analyses (CFAs) with maximum likelihood estimation were

13 conducted to examine the factor structure of CEQS-Ita. CFA is a form of Structural Equation

14 Modelling (SEM) that provides a fit for the whole model. In order to deem the model fit

15 acceptable, the following statistics must be achieved: A ratio lower than 5 between Chi-

16 square and degrees of freedom (Byrne, 2010); Comparative Fit Index (CFI), Non-normed Fit

17 Index (NNFI) and Incremental Fit Index (IFI) values equal to or greater than 0.90 (Bentler &

18 Bonnett, 1980; Byrne); and a Root Mean Square Error of Approximation (RMSEA) value

19 lower than .10 (Byrne, 2010). Additionally, an excellent model fit would be indicated by CFI,

20 NNFI and IFI values equal to or greater than 0.95 (Hu & Bentler, 1999), an RMSEA value

21 lower than .05, and upper- and lower-bound confidence interval (CI) values being tightly

22 grouped around the RMSEA (MacCallum, Browne, & Sugawara, 1996). Finally, the lower

23 the Aikake Information Criteria (AIC) the better the model fits (Jackson, Gillaspy, & Purc-

24 Stephenson, 2009).

1   Once the optimal model fit was decided upon, Pearson's correlations were computed

2 between the CEQS-Ita (composite and factor scores) and components of the Italian versions

3 of the GEQ, and subscales of the CSAI-2 revised. This provided information with regards to

4 convergent and discriminant properties of the instrument. Strength of the Pearson's

5 correlation values were described according to Evans' (1996) guidelines: .00-.19 "very

6 week", .20-.39 "weak", .40-.59 "moderate", .60-.79 "strong", and .80-1.00 "very strong".

7   **Results**

8 **Data Screening and Reliability**

9 Descriptive statistics with means, standard deviations and kurtosis for each item were analyzed

10 (See Table 1). All items presented a Kurtosis value between -0.11 and 1.62, indicating a normal

11 distribution of data (Byrne, 2010) and allowing for further parametric analyses. Good to

12 excellent Cronbach's alpha scores were reported for the overall scale ($\alpha = .95$) and each of the

13 subscales (ability, $\alpha =.90$; effort, $\alpha =.81$; persistence, $\alpha =.81$; preparation, $\alpha =.84$; and unity, α

14 $=.88$), suggesting strong internal consistency reliability.

15 **Construct Validity**

16   **Internal structure.** A first CFA was performed in order to confirm the factor

17 structure proposed by Short and colleagues (2005). The original 5-factor lower order model,

18 with the sub-dimensions of ability, effort, persistence, preparation, and unity, was tested

19 demonstrating an acceptable fit (Model fit: $X^2=462.8(158)$; $p < .001$; *CFI*=0.93; *NNFI*=0.91;

20 *IFI*=0.93; *RMSEA*=.080 [90% CI=.071-.088]; *AIC* = 619.18). However, a multicollinearity

21 problem emerged between the sub-dimensions of effort and persistence. For this reason, a

22 second model was attempted with these two sub-dimensions merged in a unique eight-item

23 sub-dimension named 'determination'. In this second CFA, the 4-factor lower order model

24 showed a stronger fit (Model fit: $X^2=448.4(161)$; $p < .001$; *CFI*=0.93; *NNFI*=0.92; *IFI*=0.93;

25 *RMSEA*=.076 [90% CI=.068-.085]; *AIC* = 586.88) and did not evidence any multicollinearity

1 problem (Table 2). All items had significant factor loadings and all the sub-dimensions

2 showed positive correlations (Figure 1). In order to assess the existence of a higher order

3 general collective efficacy factor, a third CFA was conducted to evaluate a 4-factor higher

4 order model, with the four factors considered as sub-dimensions of the construct of collective

5 efficacy. CFA for this model revealed an acceptable fit (Model fit: X^2=457.3(163); $p < .001$;

6 *CFI*=0.93; *NNFI*=0.92; *IFI*=0.93; *RMSEA*=.077 [90% CI=.069-.085]; *AIC* = 591.66). Factor

7 loadings for all items were significant and all the four sub-dimensions regressed significantly

8 on the collective efficacy construct (Figure 2). Finally, we tested the reliability of the new 8-

9 item determination subscale, which showed a Cronbach's alpha coefficient of .89, a higher

10 score than the two subscales when considered independently. A comparison between the

11 three considered models and the original model proposed by Short and colleagues is reported

12 in Table 2.

13   **Convergent evidence.** Once the CEQS-Ita structure was evaluated, a Pearson's

14 correlation test was undertaken to examine the relationship of the questionnaire with the other

15 two measurement instruments (Table 3). Moderate to strong positive correlations were found

16 between the composite score of the CEQS-Ita and the four components of the GEQ: ATG-S

17 (.33, p < .01), ATG-T (.41, p < .01), GI-S (.39, p < .01), GI-T (.66, p < .01). Sub-dimensions

18 of the CEQS were also positively correlated with the components of the GEQ. Ability

19 demonstrated weak to moderate positive correlations ranging from .22 to .42 (ATG-S: .22, p

20 < .01; ATG-T .33, p < .01; GI-S: .29, p < .01; GI-T: .42, p < .01). Determination correlations

21 were weak to strong, ranging from .32 to .64 (ATG-S: .32, p < .01; ATG-T: .39, p < .01; GI-

22 S: .39, p < .01; GI-T: .64, p < .01). Preparation correlations were weak to strong, ranging

23 from .29 to .60 (ATG-S: .29, p < .01; ATG-T: .37, p < .01; GI-S: .34, p < .01; GI-T: .60, p <

24 .01). Unity showed weak to strong positive correlations, ranging from .32 to .66 (ATG-S: .32,

25 p < .01; ATG-T: .37, p < .01; GI-S: .36, p < .01; GI-T: .66, p < .01).

1   **Discriminant evidence.** No correlations were reported between the composite score of

2   the CEQS-Ita and the cognitive (-.10, p = .10) and somatic anxiety subscales of the CSAI-2

3   revised (-.07, p = .22). Ability was not correlated with cognitive anxiety (-.10, p = .09) and

4   somatic anxiety (-.05, p = .40). Determination was not correlated with cognitive anxiety (-.08,

5   p = .16) and somatic anxiety (-.06, p = .27). Preparation was not correlated with cognitive

6   anxiety (-.04, p = .44) and somatic anxiety (-.07, p = .25). Unity showed a negative correlation

7   with cognitive anxiety (-.12 p = .04) but no correlation with somatic anxiety (-.07, p = .21).

8   **Discussion**

9   When combined, the findings from the current study suggest that the Italian version of

10   the CEQS is a reliable and valid instrument for the measurement of collective efficacy in

11   Italian-speaking interdependent team sports athletes. Exploration of the internal structure

12   suggests that a four-dimension model should be adopted for the CEQS-Ita, where effort and

13   persistence are merged in a unique sub-dimension, labelled 'determination'. In terms of

14   collective efficacy theory, Short et al. (2005) did not provide definitions for the different

15   subdimensions of collective efficacy in sports teams when developing and validating the

16   CEQS. Based on Bandura's (1997) collective efficacy theory, it is noted that effort refers to a

17   generic, motivational component (i.e., a team with high collective efficacy will produce high

18   levels of effort for a given task), whereas persistence is framed around a state where the

19   likelihood of failure is increased (i.e., a team with high collective efficacy will persist for a

20   long period when under pressure or under-performing). However, when providing guidance

21   for efficacy measurement, Bandura (2006) states that "people with tenacious belief in their

22   capabilities will persevere in their efforts" (2006, p. 314), suggesting effort and persistence

23   may overlap in terms of operationalisation and thus could be considered conceptually similar.

24   This difference is not currently reflected in the items of the original version of the CEQS. For

25   example, "perform to its capabilities" or "overcome distractions" (two items of the effort

1   subscale) and "perform under pressure" or "perform well without your best players" (two

2   items of the persistence subscale) may lead a statistical overlap between the two

3   subdimensions. To differentiate between effort and persistence, in line with Bandura's

4   suggestions for scale development (2006), it may be necessary to consider revising items of

5   the original CEQS in order to obtain a dimension of effort more related to effort expenditure,

6   and a dimension of persistence more clearly related to resilience to adversity. .

7   Both a lower order model, with all the dimensions free to correlate, and a higher order

8   model, where the four sub-dimensions all contribute towards a general construct of collective

9   efficacy, have been found to be valid for the measurement of collective efficacy through the

10   CEQS-Ita. The implication of this finding is twofold: first, the four dimensions of the CEQS-

11   Ita may be utilised as interdependent scores; second, the higher order model supports the use

12   of a composite score representing a general construct of collective-efficacy. Although both

13   these structures partially differ from those of the original CEQS, it should be noted that the 4-

14   factor model of the CEQS-Ita shows a closer fit when compared to the 5-factor model

15   proposed by Short and colleagues (2005). Such differences may be due to linguistic biases

16   apparent when translating a questionnaire across languages (cf. Van de Vijer & Hambleton,

17   1996). For example, the idiom "work ethic" in the English language is applicable to different

18   contexts but its most literal translation in the Italian language, *"etica del lavoro"* refers to

19   professional contexts. In a bid to overcome this bias and maintain equivalence above word

20   level (see Baker, 2011) the item "Demonstrate a strong work ethic" was translated as

21   *"Dimostrare un forte spirito di sacrificio"* due to the preference for this term in sports

22   contexts. This adaptation and other similar adaptations may have affected the dimensionality

23   of the instrument. It should be noted, however, that multicollinearity issues among sub-

24   dimensions of the original version of the CEQS have been reported for athletes across various

25   team sports, such as volleyball and basketball (Dithurbide et al., 2009; MacLean & Sullivan,

1 2003; Sullivan, Short, & Feltz, 2001). In their season long investigation in male basketball,

2 MacLean and Sullivan (2003) found that all the factors of collective efficacy were highly

3 correlated ($p < .001$), with very strong correlations ranging from .951 to .995. The authors

4 stated that, for their sample, collective efficacy appeared to be a unidimensional construct.

5 Similarly, Dithurbide and colleagues (2009) study on volleyball players reported highly

6 significant positive correlations between each of the CEQS factors ($r = .70$ to $.92$, $p < .01$).

7 They also conducted an Exploratory Factor Analysis (EFA) that produced one single factor.

8 In addition, in the original study developing the CEQS (Short et al., 2005), the dimensions of

9 'effort' and 'persistence' were very strongly correlated ($r = .86$, $p < .001$) and the authors

10 considered the possibility to merge the sub-dimensions to align with Bandura's (1997)

11 suggestions for efficacy measurements. Consequently, we suggest that future studies utilizing

12 the original version of the CEQS, or its translated versions, evaluate the factor structure for

13 this instrument to determine whether the original 5-factor structure is suitable for use in all

14 instances.

15   Although Italian translations of measures for other group constructs such as the GEQ

16 have provided low to moderate Cronbach's alpha values (e.g., Andreaggi et al., 2000), high

17 internal consistency reliability was reported for the CEQS-Ita for both the composite

18 collective efficacy score and sub-dimension scores (ability, determination, preparation,

19 unity). The construct validity of the CEQS-Ita was also supported through evidence of its

20 convergent and discriminant properties. Specifically, the convergent evidence for the measure

21 was supported by positive correlations with all four components of the GEQ. Larger positive

22 correlations emerged between composite CEQS-Ita scores and task-related components of the

23 GEQ when compared to social-related components, with GI-T found to have the largest

24 positive correlation with composite scores for the CEQS-Ita. The sub-dimensions of the

25 CEQS-Ita, unity and determination reported the largest positive correlations with the GEQ

1   components, whereas ability indicated the weakest positive correlations. It is also worthy of

2   note that the GI-T dimension of the GEQ and the unity dimension of the CEQS showed a

3   strong positive correlation (.66) and this may indicate a conceptual overlap between the two

4   constructs and potential multicollinearity issues when investigating cohesion and collective

5   efficacy using multivariate statistical analyses methods. Therefore, future studies should

6   proceed with caution when utilising these measurement instruments together, or,

7   alternatively, seek to use the CEQS excluding the unity subdimension (see e.g., Filho,

8   Tenenbaum, & Yang, 2015). The discriminant evidence for the CEQS-Ita was also supported

9   through the absence of correlations between the composite score of the CEQS-Ita and

10 cognitive/somatic anxiety subscale scores for the Italian version of the CSAI-2 revised. The

11 same evidence emerged for the sub-dimension scores for the CEQS-Ita, the exception being

12 the negative correlation between the unity sub-dimension and the cognitive anxiety subscale.

13 Greenlees et al. (1999) also found a negative relationship between collective efficacy and

14 cognitive anxiety in sport, and therefore our finding potentially provides further discriminant

15 evidence for the construct validity of the measure.

16   On a more applied perspective, this validation of the CEQS-Ita allows for the

17 assessment of collective efficacy among Italian speaking sports teams for the first time. For

18 researchers and practitioners operating in Italian contexts, it is now possible to assess the

19 team's perceived efficacy in a valid manner at relevant intervals across a season. For

20 example, a coach or sport psychologist could use the CEQ-Ita to measure changes in

21 collective efficacy pre- and post-match to better understand immediate responses to

22 competition, monitor collective efficacy across different periods within a competitive season

23 (e.g., pre-season, early-season, mid-season, late-season) to gauge a team's development, or

24 use the questionnaire to assess a teams' responses to psychological interventions targeting

25 increased efficacy beliefs in sports teams (e.g., Bruton, Shearer, & Mellalieu, 2019).

1   Additionally, practitioners operating within multicultural sport teams now have an instrument

2   which can be used in six different languages: English (Short et al., 2005), Spanish (Martinez

3   et al., 2011), Japanese (Hochi et al., 2012), Greek (Jowett et al., 2012), Turkish (Öncü et al.,

4   2018), and Italian, allowing the accurate assessment of collective efficacy beliefs in sports

5   teams composed of players from various countries and speaking various languages.

6   Despite the current study providing support for the utilization of the CEQS-Ita, some

7   limitations should be considered. First, we did not to run power analysis calculations, relying

8   on guidelines for sample size estimates (i.e., MacKenzie et al., 2011) and looking at

9   confidence intervals, which were adequately narrow in our study. This decision is partially

10   supported in measurement literature (see, e.g., Hoenig & Heisey, 2001; Levine & Ensom,

11   2001), but studies have suggested that power analysis is important for factor structure

12   assessment because the model fit in a SEM analysis may be affected by the sample size (see,

13   e.g., Cohen , 1988; MacCallum, et al., 1996). Therefore, it is recommended that future studies

14   run power analyses procedures to calculate the sample size when further assessing the factor

15   structure of this measure to control for the dimensionality of the CEQS (Cohen, 1988;

16   MacCallum, et al., 1996). Furthermore, support for the internal reliability of this instrument

17   was provided by strong Cronbach's alpha values for both the composite and sub-dimension

18   scores, but the reliability of this measure over time was not assessed. Future research should

19   aim to extend our study by using a longitudinal repeated measures design (cf. Myers, Feltz, et

20   al., 2004). This methodology will: (a) allow examination of the test-retest reliability of the

21   measure when collective efficacy is predicted to remain the same (e.g., off-season period);

22   and (b) permit investigation of the predictive validity of this measure by assessing the

23   collective efficacy-performance relationship across a competitive season. A reciprocal

24   relationship is said to exist between collective efficacy and team performance whereby past

25   results predict efficacy beliefs, which in turn predict subsequent performance levels (cf.

1   Beauchamp, 2007). In the present study it was not feasible to compare the performance

2   results of teams across different sports and competitive levels. Similarly, the original

3   development of the CEQS did not assess the predictive capabilities of the instrument (Short et

4   al., 2005), but studies have since provided predictive evidence to further support its validity

5   (e.g., Dithurbide et al., 2009). Predictive evidence for the CEQS-Ita can be demonstrated

6   using longitudinal studies that consider variations in collective efficacy as a function of

7   performance and vice versa. Alternatively, experimental studies can adopt the CEQS-Ita and

8   document its capability to capture changes in perceptions of collective efficacy following

9   psychological interventions, another form of predictive validity (see Bruton et al., 2016, for

10   an example).

11   In a bid to comprehensively assess the psychometric properties of the CEQS-Ita,

12   research should focus on the relationship between collective efficacy measured using this

13   domain-specific measure and collective efficacy values for sport-specific measures. Sport-

14   specific measures of collective efficacy (e.g., Myers, Payment, et al., 2004) tap into the

15   competencies associated with effective team performance in each sport and thus meet

16   Bandura's (2006) recommendations that efficacy scales consider general and specific

17   components that make-up optimal functioning for a specific task. However, such scales do

18   not permit accurate comparisons across sports and may lead to conceptual variability when

19   measuring collective efficacy beliefs in sport (Short et al., 2005). Comparing the CEQS-Ita

20   against such measures will provide further confirmation of the scale as a suitable method for

21   the assessment of collective efficacy across different team sports. Additionally, further

22   exploration of the relationship between scores for the CEQS-Ita and other group-related

23   constructs is warranted. This includes group dynamics variables that vary in terms of

24   convergence with collective efficacy as a concept, such as leadership, intra-team

25   communication and group member satisfaction, to further explore the convergent validity of

1   the measure. With regards the examination of the discriminant properties of the CEQS-Ita,

2   we note that the CEQS-Ita and the Revised CSAI-2 are based on an individual's perceptions

3   of psychological constructs. However, it should be noted that the CEQS-Ita measures

4   perceptions of a group-level construct (i.e., collective efficacy), whereas the Revised CSAI-2

5   measures perceptions of an individual-level construct (i.e. competitive anxiety). Although

6   previous studies (e.g. Greenlees et al., 1999) have already compared these two constructs and

7   provide a precedent for this comparison, future studies should further consider discriminant

8   properties of the CEQS-Ita through comparison with other group processes measures (e.g.

9   team members' satisfaction) and through other methods (e.g. multitrait-multimethod model

10   analyses, MTMM – see Byrne, 2010).

11   With specific reference to sport, invariance tests for age, gender, amount of experience,

12   level of competition, type of sport, and level of sport are required to further validate the

13   measure for use in this context (cf. Short et al., 2005). A specific limitation of the present

14   study was the inability to compare results for skill level (i.e., elite/non-elite athletes) due to

15   the disparity in the number of participants. Although it is important to understand the validity

16   of the CEQS-Ita for use with a heterogeneous sample of team sports athletes, a comparison

17   between athletes of different status will further increase the understanding of the

18   psychometrics for this instrument. Indeed, as differences in perceptions of group dynamic

19   processes have been reported between elite and non-elite performers (see e.g., Heuzé,

20   Raimbault, et al., 2006) we suggest that academics utilize the CEQS-Ita with elite team sports

21   athletes in order to provide further data for a possible meta-analysis exploring this issue. A

22   further limitation of this heterogeneous sample is that it compares sports where the team

23   structures differ. For example, in baseball teammates perform offensive actions in isolation

24   (batting) but work together when defending (fielding). In contrast, in soccer or basketball, the

25   teams must always work in unison to achieve their goals, but certain players will adopt

1 offensive roles whilst others will be defenders. As asserted by Bandura (1997), collective

2 efficacy is more predictive of team performance when the group task is highly

3 interdependent. Therefore, future research should seek to explore the invariance of the

4 CEQS-Ita in team sports with different team structures (e.g., coactive teams, interactive teams

5 with low interdependence, and interactive teams with high interdependence).

6   The CEQS-Ita contributes to the literature on collective efficacy in sport with a further

7 exploration of the construct dimensionality and provides an additional instrument for the

8 assessment of collective efficacy across different cultural contexts. Together with existing

9 translated-versions of the CEQS in other languages, the CEQS-Ita allows researchers and

10 practitioners to assess collective efficacy within multicultural sports teams. Future studies

11 should aim to adapt the questionnaire for use in other languages in order to extend its

12 applicability. It is important to note, in fact, that the adoption of a common instrument for the

13 measurement of collective efficacy allows researchers to overcome existing inconsistencies in

14 the exploration of the construct in sport. The present study is the first to explore and support

15 the reliability and validity of the CEQS-Ita for use with Italian-speaking team sports athletes.

16 Future research should be undertaken in Italian contexts to extend the validity of this

17 instrument and, in particular, to consider: (a) the stability of the scale structure over time (i.e.,

18 with longitudinal study designs); (b) the relationship between collective efficacy and

19 performance; (c) the variability of the scale structure across different team sports (e.g.,

20 baseball vs soccer) and skill level (e.g., recreational vs professional levels); (d) the

21 relationship between the CEQS-Ita and other sport-specific measures of collective efficacy

22 existing in the Italian language (e.g., the Basket Efficacy Beliefs Scale – BEBS; Steca,

23 Militello, & Gamba, 2010); and (e) the relationships between the CEQS-Ita and other group-

24 related concepts.

25

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Tables and Figures

Table 1. *Items of the original and the Italian versions of the CEQS with means, standard deviations, and kurtosis*.

Table 2**.** *Comparison between the three models considered for the CEQS-Ita and the original model of the CEQS.*

Table 3. *Correlations between the CEQS-Ita, the GEQ, and the cognitive and somatic anxiety scales of the CSAI2-r.*

Figure 1. CEQS 4-factor lower order. Standardized estimates. Model fit: X^2=448.9(161); $p < .001$; *CFI*=0.93; *NNFI*=0.92; *IFI*=0.93; *RMSEA*=.077 [90% CI=.068-.085]; *AIC* = 586.88.

Figure 2. CEQS 4-factor higher order. Standardized estimates. Model fit: X^2=457.7(163); $p < .001$; *CFI*=0.93; *NNFI*=0.92; *IFI*=0.93; *RMSEA*=.077 [90% CI=.069-.085]; *AIC* = 591.66.

Table 1. *Items of the original and the Italian versions of the CEQS with means, standard deviations, and kurtosis.*

Collective Efficacy Questionnaire for Sports				
Original items	**Italian items**	**mean**	**SD**	**K**
Ability	*Ability*			
1. Outperform the opposition	1. Avere una prestazione migliore dell'avversario	7.09	1.90	0.48
5. Show more ability than other teams	5. Mostrare maggiori capacità rispetto alle altre squadre	7.51	1.66	0.54
14. Perform more skilfully than the opponent	14. Esprimere una migliore qualità tecnica rispetto all'avversario	7.51	1.62	0.44
15. Perform better than the opposing team(s)	15. Fornire una prestazione migliore rispetto alle squadre avversarie	7.56	1.59	0.27
Effort	*Determination*			
8. Demonstrate a strong work ethic	8. Dimostrare un forte spirito di sacrificio	7.85	1.78	0.45
10. Perform to its capabilities	10. Fornire una prestazione che sia in linea con le proprie potenzialità	7.59	1.55	0.94
16. Show enthusiasm	16. Mostrare entusiasmo	8.20	1.66	1.54
17. Overcome distractions	17. Evitare distrazioni	7.11	1.90	0.27
Persistence				
3. Perform under pressure	3. Fornire una prestazione sotto pressione	7.27	1.72	-0.11
7. Persist when obstacles are present	7. Persistere di fronte agli ostacoli	7.81	1.71	1.07
9. Stay in contention when it seems like your team isn't getting any breaks	9. Rimanere in gara anche quando sembra che la propria squadra non abbia buone opportunità	7.57	1.90	0.80
11. Perform well without your best player	11. Fornire una buona prestazione senza il proprio migliore atleta	7.93	1.72	1.62
Preparation	*Preparation*			
4. Be ready	4. Essere pronti	7.72	1.65	1.21
12. Mentally prepare for this competition	12. Prepararsi mentalmente alla competizione	7.44	1.71	0.20
18. Physically prepare for this competition	18. Prepararsi fisicamente alla competizione	7.77	1.74	1.18
19. Devise a successful strategy	19. Pensare ad una strategia vincente	7.65	1.76	0.57
Unity	*Unity*			
2. Resolve conflicts	2. Risolvere i conflitti	7.52	1.96	0.95
6. Be united	6. Rimanere uniti	8.09	1.95	0.86
13. Keep a positive attitude	13. Mantenere un atteggiamento positivo	7.51	1.85	0.62
20. Maintain effective communication	20. Mantenere una comunicazione efficace	7.57	1.93	0.99

Table 2. *Comparison between the three models considered for the CEQS-Ita and the original model of the CEQS.*

	Chi-squared	df	*p*	(X^2/df)	ΔX^2	Δdf^2	*p*	CFI	NNFI/TLI	IFI	RMSEA	AIC	notes
CEQS-Ita 5-factor Lower order	**463.3**	**158**	**< .001**	**(2.9)**	**-**	**-**	**-**	**0.93**	**0.91**	**0.93**	**.080** CI=.07-.09	**619.18**	Multicollinearity between the sub-dimensions of 'effort' and 'persistence'
CEQS-Ita 4-factor Lower order	**448.9**	**161**	**< .001**	**(2.8)**	**-14.4**	**3**	**< .001**	**0.93**	**0.92**	**0.93**	**.077** CI=.07-.09	**586.88**	
CEQS-Ita 4-factor Higher order	**457.7**	**163**	**< .001**	**(2.8)**	**8.8**	**2**	**< .05**	**0.93**	**0.92**	**0.93**	**.077** CI=.07-.09	**591.66**	
Original CEQS 5-factor*	**574.3**	**160**	**< .001**	**(3.6)**	**-**	**-**	**-**	**.92**	**.90**	**-**	**.09** CI=.08-.10	**-**	*data reported from Short and colleagues (2005)

Table 3. *Correlations between the CEQS-Ita, the GEQ, and the cognitive and somatic anxiety scales of the CSAI2-r.*

	CEQS					GEQ				CSAI-2r	
	Ability	Determi nation	Prepara tion	Unity	total score	ATG-S	ATG-T	GI-S	GI-T	Somatic anxiety	Cognitive anxiety
CEQS											
Ability	(.90)										
Determination	,673**	(.89)									
Preparation	,656**	,821**	(.84)								
Unity	,563**	,797**	,743**	(.88)							
total score	,797**	,952**	,900**	,878**	(.95)						
GEQ											
ATG-S	,220**	,318**	,285**	,324**	,328**	(.70)					
ATG-T	,328**	,386**	,374**	,369**	,412**	,231**	(.61)				
GI-S	,285**	,391**	,339**	,359**	,393**	,497**	,351**	(.71)			
GI-T	,424**	,644**	,600**	,658**	,664**	,421**	,418**	,506**	(.68)		
CSAI-2r											
Somatic anxiety	-,049	-,063	-,065	-,072	-,070	,026	-,042	-,055	-,076	(.81)	
Cognitive anxiety	-,097	-,080	-,044	-,117*	-,095	-,031	-,015	-,126*	-,143*	,452**	(.82)

**. Correlation is significant at the 0.01 level (2-tailed).

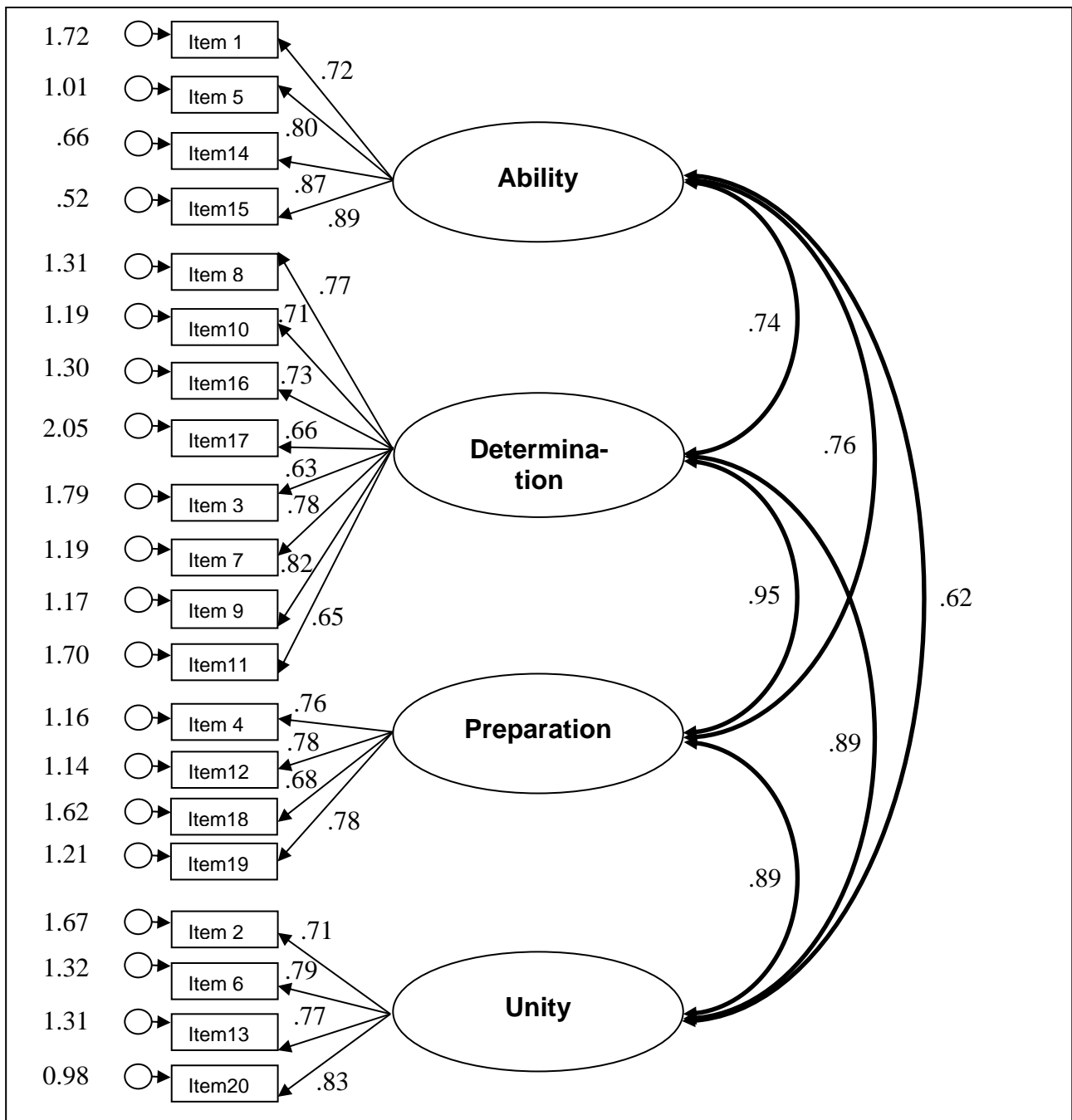*. Correlation is significant at the 0.05 level (2-tailed).

Figure 1. CEQS 4-factor lower order. Standardized estimates. Model fit: X^2=448.9(161); $p < .001$; *CFI*=0.93; *NNFI*=0.92; *IFI*=0.93; *RMSEA*=.077 [90% CI=.068-.085]; *AIC* = 586.88.
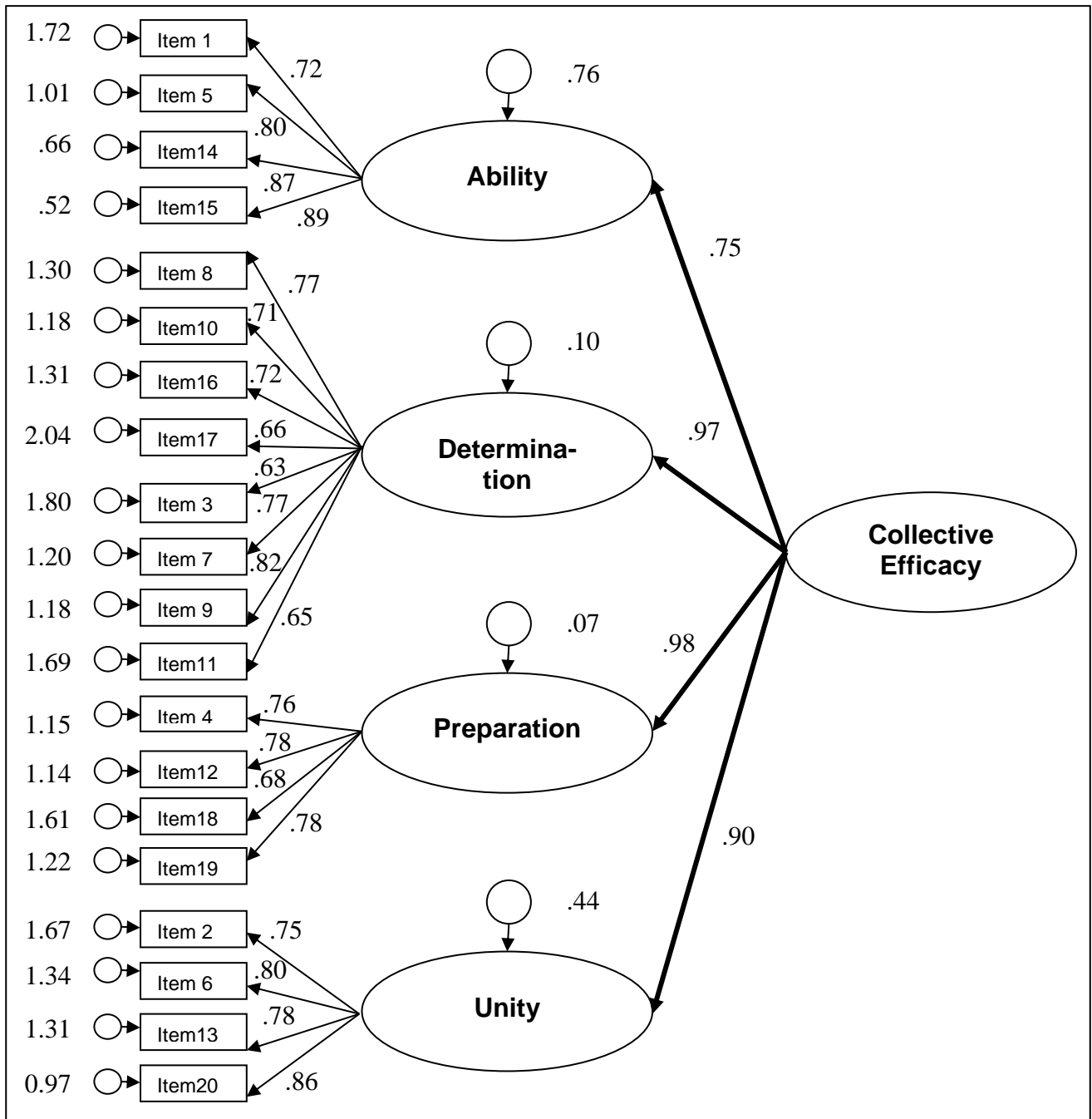
Figure 2. CEQS 4-factor higher order. Standardized estimates. Model fit: X^2=457.7(163); $p < .001$; *CFI*=0.93; *NNFI*=0.92; *IFI*=0.93; *RMSEA*=.077 [90% CI=.069-.085]; *AIC* = 591.66.