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An Experiment on the Impact of Coaches' and Athlete Leaders' Competence Support on
Athletes' Motivation and Performance.

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Abstract

Purpose. Grounded in the Cognitive Evaluation Theory, the present experiment aimed to compare the relative impact of competence support provided by coaches versus athlete leaders on players' competence satisfaction, intrinsic motivation, and performance.

Methods. We recruited 18 existing competitive male basketball teams (i.e., 126 players) to participate in the experiment. Each team was randomly assigned to one of three conditions: (1) the coach provided competence support (i.e., by encouraging, providing positive feedback, and expressing team confidence); (2) the athlete leader provided competence support; or (3) neither the coach, nor the athlete leader provided competence support (i.e., control condition).

Results. Teams in which the athlete leader provided competence support reported higher levels of competence satisfaction and intrinsic motivation than teams in the control condition, a difference that did not emerge when the coach provided competence support. Furthermore, teams in which either the coach or the athlete leader supported team members' competence performed better compared to teams in the control group.

Conclusion. Our findings highlight the importance of providing competence support to enhance team performance. Given athlete leaders' unique impact on teammates' competence satisfaction and motivation, instructing athlete leaders how to provide competence support constitutes an important motivational pathway for coaches to optimize team functioning.

Key words: shared leadership, peer leaders, Self-Determination Theory, competence satisfaction, team captain, team performance.

Introduction

Motivation is one of the driving forces underlying athletes' effort expenditure and dedication to their sport.^{1; 2} Athlete motivation can be nurtured by a wide variety of factors, including the true enjoyment and challenge of an activity but also more external rewards such as money, contingent regard from others, and media attention. Self-Determination Theory³⁻⁵ presents different forms of motivation on a continuum of increasing self-determination, with intrinsic motivation representing the hallmark of volitional or autonomous functioning. Given that intrinsically motivated people truly enjoy engaging in their sport, they absorb the information more rapidly and, as a result, make more progress and perform better.⁶ In addition, previous research highlighted the role of intrinsic motivation as a buffer against feelings of fear, depressive symptoms, and ultimately dropout.⁷⁻¹³

Given the role of motivation as driver of performance and buffer against dropout, the promotion of intrinsic motivation is especially valuable in a competitive sport setting, where the stakes are high and the external pressure often piles. Coaches, but also players and in particular the team leaders, can act as an important sources to nurture team members' intrinsic motivation¹⁴. The present experimental study will therefore investigate the relative importance of both coaches and athlete leaders in competitive sports teams.

Nurturing Intrinsic Motivation: The Cognitive Evaluation Theory

Cognitive Evaluation Theory (CET), a sub-theory of SDT highlights that athletes' intrinsic motivation can be nurtured and maintained if their inherent need to feel competent in dealing with the environment (i.e., their need for competence) gets fulfilled.¹⁵ That is, as far as athletes feel capable of mastering the required activities and have the feeling that they can exercise and extend their skills, they are more likely to perceive the activity at hand to be inherently satisfying and interesting and they will also perform better.^{16; 17} To foster athletes' intrinsic motivation, coaches are thus advised to support their need for competence, for

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example by setting optimal challenges, creating a predictable and well-structured environment through clear guidelines and expectations at the start, or by offering guidance and feedback during task execution.¹⁸⁻²⁰

The present study focuses on one of these competence-supportive behaviors, namely the provision of positive feedback. The reason for this focus is that sport activities are replete with instances of both implicit and explicit feedback. That is, feedback is often implicitly present in activity execution such that athletes observe automatically whether they can complete an activity successfully (e.g., scoring or missing a free throw). On the other hand, feedback can also be provided by external sources such as the coach or teammates. Previous research across different sports (e.g., softball, tennis, basketball, football, etc.) investigated the effects of competence-supportive feedback. Specifically, in competitive sports, positive encouragement and praise by coaches and teammates were positively related to athletes' competence satisfaction²¹, intrinsic motivation^{22; 23}, and performance.^{14; 24} Research in motor skill learning further corroborated these findings. For instance, Lewthwaite and Wulf²⁵ demonstrated that feedback emphasizing successful performances and positive normative feedback (i.e., information about how you outperform others) affected learners' motivation. This increased motivation in turn facilitated the learning of motor skills, thereby contributing to performance progress (for a review, see Wulf et al.²⁶). Feedback has thus not only a motivational impact, but these motivational benefits also carry over to athletes' motor learning and performance.^{26; 27} In the present study, we will focus on the impact of explicitly communicated positive feedback by comparing the impact of two common external sources of feedback in sports teams, namely the coach and the leader within the team.

The Motivating Role of Coaches and Athlete Leaders

Although the topic of competence support by the coach has been studied intensively, the majority of these studies were correlational in nature.^{22; 28} To our knowledge, only two

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experimental studies have been performed on whether and how coach competence support affects athletes. Both experiments showed that competence support in the form of positive feedback by the coach positively affected athletes' competence satisfaction, intrinsic motivation, and perceived performance.^{23; 24} It should be noted, though, that both studies manipulated the provided feedback via an external experimenter instead of relying on athletes' own coach as a source of feedback.

Besides the coach also athletes within the team can take up leadership roles (i.e., athlete leaders) and become an important source of competence support.^{29; 30} Previous research indeed showed that athlete leaders who provide positive feedback to their teammates have a beneficial impact on various outcomes, including teammates' team confidence, the team's cohesion, athletes' identification with their team³¹⁻³³, the team's resilience when facing setbacks,³⁴ and ultimately also the team's performance.^{30; 35}

Although studies evidenced the impact of competence support by both coaches and players, none of these studies directly contrasted these two external sources of feedback. As such, their relative impact on the team is largely unknown. However, as Fransen et al.³⁶ observed, leaders who occupy a central field position have the potential to be better leaders. As athlete leaders can lead their team from the playing field, their central position compared to the coach on the sideline potentially results in a larger impact on their teammates. On the other hand, sports teams are usually structured hierarchically, placing the coach above the players. This heightened status of coaches, in combination with the fact that they make most tactical decisions (e.g., who plays during competitive games) might help explain why the feedback of coaches has a stronger impact on the team compared to the feedback of athlete leaders.

The present study aims to investigate the motivational impact of both coaches and athlete leaders, thereby studying their relative strength. This study is part of a systematic

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research program of experimental studies by Fransen et al.^{14; 24; 37} on the motivating role of athlete leaders. These experimental studies vary in terms of the operationalization of competence support (e.g., positive feedback, confidence, encouragement), the number of included conditions, the inclusion of confederates or the actual leaders in the team to provide competence support, the type of task used (i.e., individual vs. team task), as well as the type of sport (i.e., soccer vs. basketball).

Specifically, in a first study,³⁷ teams of five basketball players were asked to perform a team task (i.e., taking free throws). A research confederate, introduced as the team captain, displayed either high or low team confidence. When the confederate expressed high team confidence, his teammates reported greater feelings of team competence, and also performed better (i.e., they scored more). In a subsequent study, Fransen et al.¹⁴ demonstrated that these findings could be generalized to an interactive passing task in soccer, with the motivational benefits of a highly confident athlete leader also emerging in relation to a control group instead of merely a low confidence group.

To further increase the ecological validity, Fransen et al.²⁴ made use of existing teams (instead of assembling players unfamiliar to each other) and asked the actual athlete leader in the team (i.e., the player being perceived as best leader by his teammates) instead of a research confederate to provide positive feedback. The findings revealed that, compared with a control group, the provision of motivating feedback by either the coach or the athlete leader promoted athletes' competence satisfaction, which, in turn, enhanced their intrinsic motivation and subjective performance satisfaction. Interestingly, competence support also produced greater quantitative performance benefits (as reflected by the increased speed at which the task was executed) without a loss in qualitative performance (as reflected by the scoring percentage). This improved objective performance could not be accounted for by a

change in either competence satisfaction or intrinsic motivation. Instead, this improvement represented an immediate benefit from the provided competence support.

However, whereas athlete leaders were the actual leaders of the participating teams and were briefly instructed by a research confederate on how to provide competence support, the coach was a research confederate who was introduced to the team as the coach for the upcoming task. In other words, the ecological validity of the competence support by the ‘coach’ can be questioned.

The Present Research

The aim of the present study was to experimentally contrast the impact of competence support provided by the actual coaches and athlete leaders of existing sport teams. In contrast to previous research,²⁴ we will no longer use a research confederate as coach. Instead we will instruct the actual coach of the team how to provide motivating feedback. This change increases the ecological validity of the experiment and allows verifying whether the previous results that were obtained with research confederates also hold for the actual coaches. In addition, given that both the coach and the athlete leader receive the same information and instructions on how to provide competence support in this study, we will be able to directly compare their impact.

Building upon previous research^{16; 17; 24; 38} and relying on the framework of CET,^{4; 5} we assume that the provision of positive feedback—whether provided by the coach or the athlete leader—will increase athletes’ competence satisfaction, which, in turn, will facilitate athletes’ intrinsic motivation and their subjective task performance. Besides this motivational pathway involving a chain of motivational processes leading to improved performance, we also examined the possibility of a direct performance pathway. In line with earlier experiments of Fransen et al.²⁴, we expect that the provided positive feedback by either the coach or the athlete leader may yield an immediate increase in objective performance. That is, the

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conveyed feedback may prompt extra effort among the athletes such that they execute the task more quickly (reflecting an improvement in quantitative task performance) and more accurately (reflecting an improvement in qualitative task performance). This increased objective performance will in turn influence participants' perceptions of performance, assessed after the test session. Both pathways are visualized in Figure 1.

Based on theorizing grounded in CET⁴ and on previous research,^{14; 23; 24} the following hypotheses can be formulated. Compared with the control condition, competence support provided by both the coach (Hypothesis 1) and the athlete leader (Hypothesis 2) is expected to increase athletes' competence satisfaction (H1a, H2a) and intrinsic motivation (H1b, H2b), as well as their subjective (H1c, H2c) and objective performance (H1d, H2d). Given the lack of research evidence on the relative impact of coaches and athlete leaders and given that, as indicated above, arguments can be made for both directions of the equation, we did not postulate an a priori hypothesis with respect to their relative impact.

With respect to the underpinning mechanisms, we expect to find, in line with the work of Fransen et al.²⁴, two mediating pathways in the prediction of intrinsic motivation and performance, as visualized in Figure 1 (Hypothesis 3). The first pathway is that players' competence satisfaction will mediate the relationship between leaders' competence support and players' intrinsic motivation, which in turn will affect their feelings of subjective performance (H3a). Besides this motivational pathway, we also expect a direct performance benefit such that the experimentally provided competence support will directly influence players' objective performance, which then will feed into players' subjective performance perceptions (H3b).

Figure 1
Structural model, representing the expected mediating pathways of the influence of competence support on participants' objective performance and competence satisfaction as described in hypothesis 3.

210 **Methods**

211 **Procedure**

212 We contacted 24 Flemish basketball clubs (with male teams active in U16 and U18
213 age categories) of which nine decided to participate in the experiment, resulting in a response
214 rate of 37.5%. Ethical consent was obtained in a first questionnaire a few weeks before the
215 experiment. Players participated voluntarily and were guaranteed full confidentiality.
216 Furthermore, the ethical committee of the first author's university approved the study design.
217 After completion of the experiment, we debriefed the participants about the actual aims and
218 conclusions of the study.

219 **Participants**

220 In total 126 players from 18 different existing competitive basketball teams
221 participated during the last part of the season (March – April). The minimum number of
222 participants required was determined by an a priori power analysis (Gpower 3: Faul et al.³⁹).
223 This power analysis was based on the results of a previous study with a similar design and
224 comparable hypotheses.²⁴ The results indicated that 84 participants would be sufficient to
225 detect a significant condition by time interaction effect with a power of .96 and an alpha of
226 .05.

227 Six clubs provided one team willing to participate, two clubs provided two teams, and
228 one club provided eight teams. This last club is one of the largest clubs in Belgium, and
229 therefore had much more teams within the targeted age category (U16-U18). The number of
230 players in the teams ranged between 5 and 10, with an average of 7 players. On average,
231 participants were 16 years old ($SD = 1.25$) and had seven years of basketball experience (SD
232 $= 3.40$). All participants played at a lower competitive level (i.e., regional or provincial level).
233 We chose not to include elite players to allow adequate variety in their performance.

Experimental Design

Procedure. The players filled out a questionnaire a few weeks before the experiment, in which they were asked to rate their teammates' on-field leadership on a scale ranging from 1 (*very bad leader*) to 7 (*very good leader*). Based on the results of this questionnaire, we appointed the player perceived as best leader of the team as that team's athlete leader. During the course of the experiment, each team successively performed the same basketball task twice. The first test served as a baseline assessment, while the second test included the actual experimental manipulation.

Task. Both test sessions involved the same basketball task, presented in Figure 2, which is based upon the task previously used by Fransen et al.²⁴ Player 1 (i.e., the athlete leader) starts by passing the ball to Player 4. The ball is immediately passed to Player 3, who in turn passes it back to Player 1 to perform a lay-up. He then receives a new ball from Player 2 and has to dribble along the cones. Player 1 passes the starting point and attempts to score with a free-throw. During the actions of Player 1, every other player in the field rotates counter-clockwise. Player 4 replaces Player 3, who takes the rebound for the lay-up and replaces Player 2. Player 2 goes to the starting position and can start the task as soon as the shot of Player 1 hits the board or rim. After Player 1 has finished his round, he gets in line after Player 5. If there are more than five players in a team, the remaining players wait behind Player 5 until it is their turn. To minimize potential learning effects the players were instructed to practice the exercise twice before starting the actual experiment. To maximize the task's ecological validity, it was designed to be highly interactive and to represent a variety of basketball-specific skills, such as passing, dribbling, lay-ups, and free-throws. During both test sessions, each player had to perform this task 10 times. Every round included two scoring opportunities, resulting in 20 shots in total (i.e., 10 free throws and 10 lay-ups).

258 *Figure 2.* The set-up of the highly interactive basketball test, used in the present study.

259
260 **Manipulation.** We established a baseline measurement during the first test session, in
261 which the coach or athlete leader received no specific directions beyond the formal
262 instructions of the experimental leader on how to execute the exercise. Adopting a 3 x 2
263 design, using time as within-subjects variable, each participating team was randomly
264 distributed in one of three conditions; (1) competence support by the coach; (2) competence
265 support by the athlete leader; (3) control condition in which no competence support was
266 provided. We standardized each of these conditions using a detailed script, as outlined in
267 more detail below. Appendix B provides the full script.

268 In the coach condition (i.e., in which the coach provided competence support), the
269 experimental leader asked the coach after the first test session to provide positive feedback,
270 both at the individual and at the team level. The experimental leader illustrated his
271 instructions by showing the coach a visual scheme (Appendix A). This scheme included
272 examples on how to provide competence support for individual players (e.g., “Good job, that
273 was a great shot!”), as well as on how to provide competence support to the entire team (e.g.,
274 “Keep going, we are definitely going to be the fastest team if we keep this up!”). With respect

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to the frequency, the experimental leader asked the coach to provide competence-supportive feedback to the player at least once during every round (i.e., one player performing the exercise), and to provide positive feedback at the team level at least once during every five rounds. This brief intervention lasted about two minutes. If the coach did not deliver feedback at the requested frequency, the research confederate reminded him of his task during the second part of the experiment.

In the athlete leader condition (i.e., in which the athlete leader provided competence support), the experimental leader instructed the athlete leader after the first baseline measure. The experimental leader informed him of the fact that he was seen as the best leader by his teammates and provided identical instructions as for the coach in the coach condition. Again, a visual scheme (Appendix A) was used to illustrate how the athlete leader could provide competence support both at the individual and at the team level. The same frequency of feedback was requested as in the coach condition, namely once during each round to the player executing the task and once at the team level every five rounds. This intervention also took about two minutes. Also in this case, the research confederate reminded the athlete leader of his task if he did not deliver feedback at the requested frequency. In the control condition, the second test session resembled the baseline test; neither the coach, nor the athlete leader was instructed to provide competence support.

Measures

Participants filled out a questionnaire after both test sessions. In addition, the experimental leader tracked the frequency of the provided feedback and an additional research assistant tracked the execution time and the number of scores.

Manipulation check

Frequency of feedback. The experimental leader tracked the number of times that the coach and the athlete leader provided competence support either at the individual or at the

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team level. In this way we obtained the objective frequency of the total amount of individual- and team-oriented feedback, provided by the coach and the athlete leader.

Perceived competence support. Participants were asked to assess the competence support of both the coach and each team member by rating “the extent to which they helped you to improve, encouraged you, and made you feel like that you performed well during the basketball task” on a scale of 1 (*absolutely not*) to 7 (*very strongly*).

Outcome variables

Competence satisfaction. We used a six-item measure to assess participants’ competence satisfaction, with an example item being “During the previous basketball test, I felt like I could perform well.” These items were based on suggestions from Mouratidis et al.⁴⁰ Participants rated each team member on a scale from 1 (*absolutely not*) to 7 (*very strongly*). The Cronbach alphas of .69 and .75 after the first and second test session, respectively, demonstrated sufficient internal consistency of the scale.

Intrinsic motivation. Participants completed a four-item scale on intrinsic motivation as suggested by Mouratidis et al.¹⁶ A sample item reads “I tried my best during the previous basketball test, because I had fun doing so.” Participants had to rate their agreement on a scale varying from 1 (*absolutely not*) to 7 (*very strongly*). The Cronbach alphas of .91 and .93 after the first and second test session, respectively, demonstrated an excellent internal consistency of this scale.

Performance. We assessed both subjective and objective performance. With respect to subjective performance, participants rated their agreement with the following four items; “I/My team can complete the task fast” and “I/My team can perform the task accurately” on a scale from 1 (*absolutely not*) to 7 (*very strongly*). With respect to objective performance, the experimental assistant registered the number of lay-ups and free-throws that the participant scored during one test session. Given that participants had 20 scoring opportunities in total

(i.e., 10 free throws and 10 lay-ups), their performance *accuracy* score could vary between 0 and 20. Second, the research assistant tracked the time each player needed to complete the task. By adding the individual times per round, we obtained the total time each participant needed to complete his rounds (i.e., performance *speed*). To assess the *overall performance*, we added a penalty of five seconds for each missed score, a rule that was communicated to participants before the start of the experiment.

Statistical Analysis

The means, standard deviations, and correlations between all variables are presented in Table 1. Before testing differences as a function of condition assignment, we explored whether the conditions for using parametric tests were met. A Shapiro-Wilk test indicated that the observed distribution of all variables deviated from the normal distribution, with the exception of performance speed and overall performance.

For those variables that did not meet the assumption of normality, we opted for non-parametric analyses. Next, we examined whether the change for any variable within a given condition significantly differed from the observed change in the other conditions. To do so, we first calculated condition-specific change scores and then compared these changes using a Kruskal-Wallis test. The effect size η^2 was calculated by dividing the test statistic χ^2 by the number of observations minus one. In a next step, we determined whether the outcome within a specific condition increased or decreased from Time 1 to Time 2 using a Wilcoxon Signed-Rank test (i.e., pretest vs. posttest). The effect size r was calculated by dividing the test statistic, z , by the square of the number of observations. Effect sizes range between 0 and 1, with the benchmarks of $r = .10$ for small effects (explaining 1% of the variance); $r = .30$ for medium effects (explaining 9% of the variance); and $r = .50$ for large effects (explaining 25% of the variance).⁴¹ Table 2 outlines the results of both nonparametric tests.

350 Means, standard deviations, and correlations between all the included variables.

	<i>M</i>	<i>SD</i>	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
1. Perceived competence support of the coach at T1	4.93	1.72																			
2. Perceived competence support of the coach at T2	5.05	1.92	.61***																		
3. Frequency of feedback by the coach at T1	10.78	19.63	.46	.35																	
4. Frequency of feedback by the coach at T2	35.33	53.52	.33	.60*	.83**																
5. Perceived competence support of the athlete leader at T1	4.95	1.46	.39***	.36*	.99	.94															
6. Perceived competence support of the athlete leader at T2	5.85	1.23	.26*	.25*	.99	.94	.51***														
7. Frequency of feedback by the athlete leader at T1	5.28	4.86	.08	.27	.21	.28	.50	.50													
8. Frequency of feedback by the athlete leader at T2	24.39	29.84	.05	.21	-.11	-.07	.50	.50	.43												
9. Competence satisfaction at T1	5.02	2.44	.02	.01	.19	.08	-.04	.17	-.09	-.14											
10. Competence satisfaction at T2	4.99	1.03	.14	.52	.27	.28	.02	.31**	-.14	.32	.29**										
11. Intrinsic motivation at T1	4.91	1.18	.08	.01	.26	.45	.01	.01	.27	.42	.11	.42***									
12. Intrinsic motivation at T2	5.01	1.27	.09	.05	.20	.36	.06	.17	.19	.45	.08	.54***	.75***								
13. Subjective performance at T1	4.39	1.33	.01	-.08	.37	.18	.14	.21*	-.06	-.01	.25**	.35***	.14	.122							
14. Subjective performance at T2	5.02	1.30	.1	.02	-.1	-.15	.19*	.29**	-.17	.33	.14	.6***	.09	.31***	.22*						
15. Performance accuracy at T1	13.48	2.41	-.09	-.03	.27	.12	.07	.10	-.17	-.23	.19*	.24**	-.03	-.06	.47***	.09					
16. Performance accuracy at T2	13.50	2.43	-.03	-.07	.01	-.03	-.02	-.01	.01	.01	.24**	.25**	-.01	.00	.13	.31***	.49***				
17. Performance speed at T1	147.00	13.53	.14	.18	.04	.01	.10	-.22*	-.16	-.35	-.07	-.14	-.09	-.13	.14	-.04	.02	-.17			
18. Performance speed at T2	140.07	15.19	.08	.03	-.09	-.17	.07	-.22*	-.20	-.49*	-.09	-.12	-.08	-.14	.16	-.1	-.06	-.22*	.83***		
19. Total performance at T1	179.58	17.96	.17	.15	-.12	-.06	.03	-.23*	-.05	-.21	-.18*	-.26**	-.05	-.06	-.23**	-.09	-.66***	-.46***	.74***	.66***	
20. Total performance at T2	172.57	21.41	.07	.06	-.07	-.11	.06	-.15	-.14	-.35	-.20*	-.23*	-.05	-.1	.04	-.25**	-.32***	-.72***	.68***	.83***	.73**

351 * $p < .05$; ** $p < .01$; *** $p < .001$. Performance accuracy = number of shots scored / Performance speed = time needed to perform the task / Total performance = time + 5s * # missed shots

352 *Table 2*

353 The results of the Wilcoxon Signed Rank test and Kruskal Wallis test.

	<i>M</i> at Time 1 (<i>SD</i>)	<i>M</i> at Time 2 (<i>SD</i>)	Wilcoxon Signed Rank test (<i>Z</i>)	Kruskal-Wallis test (χ^2) <i>Coach condition</i> <i>Athlete leader condition</i>	
1. Perceived competence support by the coach					
A. Coach condition	5.4 (1.5)	6.1 (1.4)	-3.77***		
B. Athlete leader condition	4.2 (1.8)	4.0 (2.0)	-1.00	7.41**	
C. Control condition	5.1 (1.7)	4.9 (1.7)	-2.00*	18.46***	.98
2. Frequency of feedback by the coach					
A. Coach condition	23.7 (30.1)	93.8 (58.4)	-2.20*		
B. Athlete leader condition	7.0 (9.1)	7.5 (9.2)	-.41	8.37**	
C. Control condition	1.7 (2.7)	4.7 (9.1)	-.32	8.34**	.03
3. Perceived competence support by the athlete leader					
A. Coach condition	4.7 (1.0)	5.0 (1.0)	-2.96**		
B. Athlete leader condition	4.7 (.6)	6.1 (.4)	-4.25***	5.74*	
C. Control condition	4.6 (1.0)	5.1 (.8)	-3.01**	.99	.84
4. Frequency of feedback by the athlete leader					
A. Coach condition	8.0 (6.7)	20.5 (31.8)	-1.84		
B. Athlete leader condition	5.3 (3.6)	49.2 (26.9)	-2.20*	5.06*	
C. Control condition	2.5 (2.1)	3.5 (4.0)	-.80	.33	8.37**
5. Satisfaction of need for competence					
A. Coach condition	22.4 (4.5)	23.6 (4.4)	-1.33		
B. Athlete leader condition	22.7 (4.7)	24.9 (4.8)	-2.70**	1.33	
C. Control condition	23.5 (8.8)	23.5 (5.8)	-1.64	.49	4.16*
6. Intrinsic motivation					
A. Coach condition	4.9 (1.4)	4.9 (1.3)	-.51		
B. Athlete leader condition	5.0 (1.1)	5.2 (1.1)	-2.31*	2.56	
C. Control condition	4.9 (1.0)	4.9 (1.4)	-.05	.02	1.43
7. Subjective performance					
A. Coach condition	4.2 (1.4)	5.0 (1.1)	-2.71**		
B. Athlete leader condition	4.6 (1.4)	5.3 (1.1)	-2.73**	.32	
C. Control condition	4.4 (1.1)	4.8 (1.6)	-1.66	.40	< .001
8. Performance accuracy (i.e., number of shots scored)					
A. Coach condition	13.8 (2.7)	14.4 (2.4)	-1.51		
B. Athlete leader condition	14.1 (2.0)	14.0 (2.3)	-.73	2.90	
C. Control condition	12.5 (2.2)	12.0 (1.9)	-2.2*	6.82**	.18

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

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For the two normally distributed performance variables (i.e., performance speed and overall performance), we used 3x2 Repeated Measures ANOVA's with time as the within-subjects repeated measure (second vs first test session) and the three conditions as between-subject factors. As post hoc analysis, we conducted a 2x2 repeated measures ANOVA for each pair of experimental conditions. These results are displayed in Table 3. SPSS 24 was used for all these analyses.

To examine the mediating effect of objective performance and competence satisfaction on players' intrinsic motivation and their subjective performance, we performed Structural Equation Modelling (SEM) using STATA 13. More specifically, we tested the model postulated by Fransen et al.²⁴ (Figure 1) by performing a path analysis. Similar as in the study of Fransen et al.²⁴ we created two dummy variables that represented the experimental conditions in our model, thereby using the control condition as a reference point. The first dummy variable represented competence support by the coach (i.e., comparing the situation in which the coach provided competence support (1) to the situation in which no one provided competence support (0)). Similarly, the second dummy variable represented the competence support provided by the athlete leader relative to the control group.

The outcome variables included in this model all reflect improvement over time. For performance accuracy, competence satisfaction, intrinsic motivation, and subjective performance, we calculated the improvement by the posttest score minus the pretest score. For performance speed (assessed by the time the participants needed to complete the exercise), however, we calculated the improvement in speed by subtracting the posttest score from the pretest score as a decrease in time reflects an improvement in performance speed. It should be noted that participants' motivation and their subjective performance were only assessed upon termination of the task (and thus after the objective performance). Therefore, in line with the findings of Fransen et al.²⁴ we modeled objective performance as a potential driver of one's motivational functioning and subjective performance.

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Table 3

The results of the 3 x 2 repeated measures ANOVA's with the outcome variables as dependent variables, time (second vs. first test session) as the within-subjects repeated measure, and the experimental conditions as the between-subjects factors, including the results of the post hoc analyses of the interaction effects.

	<i>M</i> at first session (<i>SD</i>)	<i>M</i> at second session (<i>SD</i>)	Main time effect (<i>F</i>)	Interaction effect time x condition (<i>F</i>)	Post hoc tests	
					<i>Coach</i> <i>condition</i>	<i>Athlete leader</i> <i>condition</i>
1. Performance speed (i.e., time needed to perform the task)			98.19***	23.19***		
A. Coach condition	145.0 (11.7)	133.4 (8.8)				
B. Athlete leader condition	143.5 (13.6)	135.8 (15.2)			5.53*	
C. Control condition	153.3 (13.6)	152.8 (13.7)			43.80***	21.31***
2. Total performance (time + 5s * # missed shots)			29.89***	16.77***		
A. Coach condition	176.2 (18.6)	161.6 (15.4)				
B. Athlete leader condition	173.1 (13.9)	166.0 (17.5)			6.83*	
C. Control condition	190.8 (16.1)	193.1 (17.0)			35.60**	9.62**

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

Note. The post hoc analyses represent the interaction effect of a 2 x 2 repeated measures ANOVA for each pair of experimental conditions.

Results

Manipulation Check

Competence support by the coach. Kruskal-Wallis Tests revealed that the increase in rated frequency of positive feedback and athlete perceived competence support in the coach condition was significantly larger compared to the observed changes in both the athlete leader condition ($\chi^2(1) = 8.37, p < .01, \eta^2 = .10$ and $\chi^2(1) = 18.46, p < .001, \eta^2 = .22$) and the control condition ($\chi^2(1) = 8.34, p < .01; \eta^2 = .10$ and $\chi^2(1) = 7.41, p < .01, \eta^2 = .09$). Examining the changes within each condition, the results of Wilcoxon Signed-Rank Tests revealed that the feedback provided by the coach and the experienced competence support by the athletes significantly increased in the coach condition over time ($r = -.90, p < .05$ and $r = -.57, p < .001$), an increase that was not observed in the athlete leader and the control condition. These findings indicate that the manipulations were successful.

Competence support by the athlete leader. Kruskal-Wallis Tests revealed that the increase in rated frequency of provided feedback in the athlete leader condition was significantly larger compared to the observed changes in both the coach condition ($\chi^2(1) = 5.06, p < .05, \eta^2 = .06$) and the control condition ($\chi^2(1) = 8.37, p < .01, \eta^2 = .10$). In addition, the increase in athlete perceived competence support was significantly larger in the athlete leader condition than in the coach condition ($\chi^2(1) = 5.74, p < .05, \eta^2 = .07$). However, in contrast to our intentions, no significant difference with the control condition emerged. Examining the changes within each condition, the results of Wilcoxon Signed-Rank Tests revealed that the athlete leader's competence support as experienced by the other athletes significantly increased in each of the three conditions (coach condition: $r = -.45, p < .01$; athlete leader condition: $r = -.74, p < .001$; control condition: $r = -.60, p < .01$). Although the increase is strongest in the athlete leader condition, the fact that we also observe an increase in the coach and control condition is not in line with our intended manipulation. On the other

hand, the objective amount of feedback provided by the athlete leader only increased significantly in the athlete leader condition ($r = -.75, p < .05$), an increase that was not observed in both other conditions, which is in line with our intended manipulation.

These contrasting findings mean that, while the athlete leader objectively provided more positive feedback when requested (i.e., only in the athlete leader condition), the other players also perceived competence support by the athlete leader when he was not asked to provide positive feedback (i.e., in the coach and control condition). In an attempt to identify the reason behind this contrast, we assessed the competence support provided by the other athletes in the team. That is, we asked participants to what extent the other athletes in the team (with exception of the athlete leader) provided positive feedback. Our findings revealed that the perceived competence support of the other athletes increased significantly, not only in the athlete leader condition ($r = -.52, p < .05$), but also in the coach condition ($r = -.52, p < .05$). The contagion phenomenon⁴² in the latter condition could explain why also the athlete leader was perceived to provide competence support. More specifically, this phenomenon asserts that by expressing different moods and emotions, both verbally and non-verbally, people can strongly influence the emotions and feelings of a group around them. This is especially true for people who occupy a hierarchical position, such as the coach.⁴³⁻⁴⁵ In the coach condition, the experienced positive competence support by the coach might thus have spread throughout the team. As a result, not only the perceived competence support of the other athletes increased, but also that of the athlete leader, explaining our unexpected observation in the coach condition.

Impact of Coaches and Athlete Leaders on Outcome Variables

Athlete-reported outcomes. Kruskal-Wallis Tests revealed that while the coach condition failed to produce a larger change in athletes' competence satisfaction compared to the control condition, the athlete leader condition did ($\chi^2(1) = 4.16, p < .05, \eta^2 = .05$). The

coach and athlete leader condition did not differ significantly from each other. Examining the changes within each condition, Wilcoxon-Signed ranked tests revealed that participants' competence satisfaction increased significantly in the athlete leader condition ($r = -.37, p < .05$), while a similar change was not observed in either the coach or the control condition. These findings are in contrast with H1a, but confirm H2a. Although the Kruskal-Wallis test revealed no significant difference in competence satisfaction between the coach and the athlete leader condition, the Wilcoxon-Signed Ranked tests pointed to a difference. Specifically, athlete leaders did influence their teammates' competence satisfaction while the coach did not.^a

Next, Kruskal-Wallis Tests revealed no significant differences in either intrinsic motivation or subjective performance between the three conditions. Follow-up Wilcoxon-Signed Rank Tests revealed no significant changes over time in the control condition in any of these outcomes. In line with H2b and H2c, a significant increase over time was observed in the athlete leader condition for both intrinsic motivation ($r = -.36, p < .05$) and subjective performance ($r = -.37, p < .05$). In the coach condition, no parallel increase in intrinsic motivation was observed, while a significant increase in subjective performance did emerge ($r = -.40, p < .01$). These findings are in contrast to H1b, but are in line with H1c.

Objective performance. The overall performance was a combined measure of speed and accuracy, calculated by adding five penalty seconds to their execution time for each missed scoring opportunity (i.e., shots or lay-ups). Repeated Measures ANOVA revealed a significant interaction effect ($F = 16.77, p < .001$) between the three conditions. Post hoc tests

^a We also included a 12 item measure, developed by Chen et al.⁴⁶, to examine whether our manipulation impacted competence explicitly or instead affected all three needs (i.e., competence, autonomy, relatedness) identified in Self-Determination Theory. More specifically, we assessed participants' satisfaction and frustration of these three needs. Additional analyses revealed no significant differences between conditions for either autonomy or relatedness satisfaction. Similarly, no differences were found between conditions for need frustration on any of these three needs. These findings confirm that our manipulation solely affected participants' competence satisfaction, as intended.

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demonstrated significant interaction effects between the coach and the control condition ($F = 35.60, p < .01$), between the athlete leader and the control condition ($F = 9.62, p < .01$), and between the coach condition and the athlete leader condition ($F = 6.83, p < .05$). These results reveal that participants in both competence-supportive conditions performed better than participants in the control condition, thereby confirming H1d and H2d. However, the impact of the coach on participants' objective performance is larger than the impact of the athlete leader.

Next, we broke the composite performance score in its subcomponents (i.e., speed and accuracy) to examine their separate effects. First, with respect to speed (i.e., the time needed to perform the task), Repeated Measures ANOVA revealed a significant interaction effect ($F = 23.19, p < .001$) between the three conditions. Post hoc tests demonstrated a significant interaction effect for execution speed between the coach and the control condition ($F = 43.80, p < .001$) as well as between the athlete leader and the control condition ($F = 21.31, p < .001$). These findings indicate that players executed the task faster when receiving competence support, regardless of the source of competence support. Moreover, players executed the task faster when the coach provided competence support than when athlete leaders did ($F = 5.53, p < .05$).

Second, with respect to scoring accuracy (i.e., the number of scored shots), which deviated from the normal distribution, Kruskal-Wallis Tests revealed a significant difference in accuracy between the coach condition and the control condition ($\chi^2(1) = 6.82, p < .01, \eta^2 = .08$). However, such a difference did not occur between the athlete leader and the control condition. This implies that while players are more successful in their scoring opportunities when the coach provides competence support compared to the control condition, this is not the case when the athlete leader provides competence support. The coach and the athlete leader condition did not differ significantly from each other. More specifically, while the

Wilcoxon-Signed Rank Tests demonstrated no significant changes in accuracy over time for the coach or the athlete leader condition, they did reveal a significant drop in accuracy over time for the control condition ($r = -.36, p < .05$).

Sensitivity Analysis

As participants were part of different teams, we performed a sensitivity analysis to control for the clustered nature of our data. Using the statistical program R 3.4.4, we implemented multilevel regression modelling and compared those results with the original results. We included time as a Level 1-predictor, condition as a Level 2-predictor, and a random intercept as Level 3-predictor, which controls for biased results that can occur due to nesting. The results of these multilevel regression modelling analyses are presented in Table 4 and corroborate all interaction effects found previously when controlling for clustering. There was only one exception; while our original results revealed that the athlete leader condition produced a larger change in athletes' competence satisfaction compared to the control condition, this interaction effect was only marginally significant when controlling for clustering ($p = .05$). In general, we can conclude that our original analyses were robust and provide accurate insight in our nested data.

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501 *Table 4*

502 The results of the multilevel regression modelling, including time as a level 1-predictor, condition as a level 2-predictor, and a level 3 random
 503 intercept. The table displays interaction effects between all conditions and between all three combinations of two conditions.

	All conditions		Coach and control condition		Athlete leader and control condition		Coach and athlete leader conditions	
	Interaction effect (β)	Standard error (SE)	Interaction effect (β)	Standard error (SE)	Interaction effect (β)	Standard error (SE)	Interaction effect (β)	Standard error (SE)
1. Satisfaction of need for competence	-.09	.07	-.07	.07	-.21 [°]	.11	.19	.19
2. Intrinsic motivation	.01	.06	.02	.06	-.11	.10	.29	.17
3. Subjective performance	-.11	.12	-.10	.12	-.11	.19	-.09	.35
4. Total performance (time + 5s * # missed shots)	5.52 ^{***}	.96	5.62 ^{***}	.94	4.67 ^{**}	1.50	7.52 ^{**}	2.84
5. Performance speed (i.e., time needed to perform the task)	3.70 ^{***}	.54	3.70 ^{***}	.55	3.62 ^{***}	.77	3.88 [*]	1.63
6. Performance accuracy (i.e., number of shots scored)	-.37 [*]	.17	-.38 [*]	.17	2.72	1.65	-.72	.55

[°] $p = .05$; ^{*} $p < .05$; ^{**} $p < .01$; ^{***} $p < .001$.

Explanatory Role of Motivational Processes

In the path analyses, we initially tested the model proposed in Figure 1. Two modifications were made to improve the model fit, that is, a direct relation between performance accuracy and competence satisfaction was added and the path between performance accuracy and performance speed was removed. The final model confirmed the proposed dual pathway model, involving a motivational route and a performance-related route, presented in Figure 3. This model yielded a very good fit to our data according to the guidelines suggested by Hooper et al.⁴⁷ ($\chi^2(8) = 8.74$, $p = 3.37$, $CFI = .99$, $TLI = .98$, $RMSEA = .03$, $pclose = .57$, $SRMR = .04$). The motivational pathway showed that experimentally induced athlete leader competence support predicted an increase in players' competence satisfaction, which in turn nurtured their intrinsic motivation, confirming H3a. Both intrinsic motivation and competence satisfaction predicted players' subjective performance. Although the manipulated coach competence support had no direct effect on players' competence satisfaction, the coach did so in an indirect way. More specifically, via affecting the performance pathway (i.e., by influencing players' accuracy, which in turn influenced their competence perceptions).

The performance-based pathway was in line with our expectations, confirming H3b, in that the competence support of the coach directly influenced players' speed and their accuracy. However, the athlete leader only influenced players' execution speed, and not their accuracy. In turn, both of these two objective performance variables (i.e., speed and accuracy) predicted players' subjective performance.

As a final step, we wanted to confirm the results provided by the path analysis, as difference scores have been criticized previously (see Henk and Castro-Schilo⁴⁸ for an historical overview). To do so, we implemented the suggestions of Valente and MacKinnon⁴⁹ and assessed the mediation using Analyses of Covariance (ANCOVA) fitted with the latent change score (LCS) specification. In order to be able to fit our original model (Figure 3) to the model suggested by Valente and MacKinnon⁴⁹ (Figure 4), we performed 10 separate ANCOVA's fitted with the LCS specification. These results, displayed in Table 5 corroborate our previous findings on the dual pathway and the impact of coaches and athlete leaders.

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Figure 3

Structural model, representing the influence of competence support on participants' objective performance and competence satisfaction. All variables represent the improvement over time. Standardized regression coefficients are included ($p < .05$; $p < .01$; $p < .001$), as well as the proportions of explained variance (in italics).

538 *Figure 4*

539 Path diagram of Analyses of Covariance (ANCOVA) fitted with the latent change score (LCS) specification. The second wave of the mediator
 540 and the outcome are included as a unit-weighted function of pretest and a new unobserved change variable (ΔM and ΔY) to mimic subtracting
 541 pretest scores from posttest scores on the respective variables. The diagram includes pretest correlation between mediator and dependent variable
 542 ($\sigma_{m_1y_1}$), stability of mediator ($S_{\Delta mm1}$), stability of dependent variable ($S_{\Delta yy1}$), ΔY cross-lag ($b_{\Delta ym1}$), ΔM cross-lag ($b_{\Delta my1}$), effect of X on ΔM
 543 ($a_{\Delta mx}$), effect of X on ΔY ($c'_{\Delta yx}$), and effect of ΔM on ΔY ($b_{\Delta Y\Delta m}$).

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544 *Table 5*

545 The results of Analyses of Covariance (ANCOVA) fitted with the latent change score (LCS) specification. Figure 4 provides a visual scheme of
546 these analyses.

<i>Mediating variable (M)</i>	<i>Dependent variable (Y)</i>	a path (SE)	b path (SE)	c' path (SE)	Ind Effect (SE)	Pretest Cov. (SE)	Y1 -ΔM (SE)	M1- ΔY (SE)	M Stab (SE)	Y Stab (SE)	Δχ ² (df)	CFI	RMSEA
Competence support by the coach (X)													
Performance speed	Subjective performance	7.47*** (1.46)	.11*** (.02)	-.27 (.22)	.81* (.12)	2.08 (1.37)	.51 (.53)	-.10 (.01)	-.11* (.05)	-.77*** (.10)	2.80 (2)	1.00	.06
Performance accuracy	Subjective performance	1.09** (.39)	.23*** (.06)	-.28 (.23)	.25* (.11)	1.48*** (.26)	-.17 (.17)	.10 (.07)	.48 (.09)	-.74 (.10)	4.56 (2)	.96	.10
Performance accuracy	Satisfaction of need for competence	1.16*** (.38)	.09** (.04)	-.19 (.17)	.11* (.05)	.75*** (.22)	-.01 (.20)	.08 (.04)	-.52*** (.09)	-.46*** (.09)	2.31 (2)	1.00	.04
Satisfaction of need for competence	Subjective performance	-.06 (.17)	.86*** (.12)	.02 (.19)	-.05 (.14)	.64*** (.13)	.08 (.08)	.54*** (.16)	-.49*** (.10)	-.90*** (.08)	1.54 (2)	1.00	<.001
Satisfaction of need for competence	Intrinsic motivation	-.08 (.15)	.39*** (.10)	-.16 (.13)	-.03 (.06)	.27** (.10)	.31*** (.06)	.15 (.10)	-.53*** (.08)	-.27*** (.07)	.69 (2)	1.00	<.001
Competence support by the athlete leader (X)													
Performance speed	Subjective performance	3.92* (1.47)	.10* (.02)	.26 (.24)	.40* (.05)	2.12 (1.37)	.90 (.61)	-.01 (.01)	-.10 (.06)	-.78*** (.10)	5.55 (2)	.97	.11
Performance accuracy	Subjective performance	.28 (.44)	.21*** (.06)	.28 (.21)	.06 (.10)	1.48*** (.26)	-.25 (.17)	.07 (.06)	-.45*** (.09)	-.73*** (.09)	4.14 (2)	.96	.09
Performance accuracy	Satisfaction of need for competence	.24 (.44)	.08* (.04)	.26 (.16)	.02 (.04)	.75*** (.22)	-.07 (.22)	.06 (.04)	-.50*** (.09)	-.44*** (.09)	4.59 (2)	.97	.10
Satisfaction of need for competence	Subjective performance	.29* (.16)	.85*** (.12)	.09 (.18)	.24* (.14)	.64*** (.13)	.06 (.08)	.54*** (.16)	-.47*** (.10)	-.90*** (.08)	3.22 (2)	.99	.07
Satisfaction of need for competence	Intrinsic motivation	.28* (.15)	.38*** (.11)	.16 (.16)	.11* (.06)	.27** (.10)	.31*** (.06)	.15 (.10)	-.53*** (.08)	-.027*** (.07)	.19 (2)	1.00	<.001

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

547

Discussion

The aim of this research was to investigate the impact of the coach and the athlete leader on their team's competence, intrinsic motivation, and performance. To maximize the ecological validity of the study, we sampled existing teams and instructed the actual coach and actual athlete leader of the team to provide competence support instead of working with research confederates who are unfamiliar to the athletes.

Our findings reveal that if coaches and athlete leaders increase their competence-support, team members' performance is immediately enhanced. This finding corroborates the general literature on how both coaches^{24; 50-52} and athlete leaders^{14; 37; 53} can affect performance. However, the present study also provides some novel insights. First, the coach has a larger direct impact on participants' objective performance than the athlete leader. Specifically, when breaking down the composite score into its constituting components (i.e., speed and accuracy), it appeared that coaches positively influenced both players' speed and accuracy, while athlete leaders only affected teammates' speed.

A possible explanation for this discrepant influence of coaches and athlete leaders is that scoring depends on a technical basketball skill (i.e., a shot or lay-up). Research in the field of motor learning through direct instruction shows that, when the goal of an instruction is the acquisition of a basic skill, then a direct teaching style (i.e., the teacher instructs a student) is superior to learner-centered instruction (i.e., students instruct each other).^{54; 55} A potential underpinning reason for this observation is that athletes might feel that their athlete leader, a peer, is not able to provide more in-depth technical advice about scoring above and beyond their own knowledge.⁵⁶⁻⁵⁹ Yet, the provided positive feedback by the peer may lead them to put extra effort in the activity such that the exercises are executed more quickly. Related to this explanation is the possibility that the feedback provided by coaches and athlete leaders is qualitatively different. That is, coaches might be more proficient in providing

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technical feedback, because of their training to become a coach. As a result, coaches' feedback might have a stronger impact on players' ability to score their shots.

A second difference between coaches and athlete leaders is that only when the athlete leaders (and not the coaches) provided competence support, participants reported enhanced competence satisfaction and intrinsic motivation compared with the control group. These findings corroborate previous literature on the positive impact of athlete leaders in general (for a review, see Cotterill and Fransen⁶⁰), and more specifically on the positive motivational outcomes when athlete leaders engage in providing competence support.^{14; 24} The lack of a direct impact of the coach on this motivational pathway contradicts earlier literature on the positive impact of coaches' competence support (for a review, see Horn⁶¹). For example, Fransen et al.²⁴ observed earlier that competence support by the coach did increase athletes' competence satisfaction and intrinsic motivation to an extent that was similar compared to when the athlete leader provided competence support. However, it should be noted, that in this earlier experiment a research confederate with specific training in providing competence support acted as the coach of the team, and not the actual coach of the team, as was the case in our experiment. Results from the present study thus suggest that coaches are able to have a direct impact on their team's competence satisfaction, but they may require more specific training to do so. Unlike coaches, athlete leaders are able to achieve a significant impact with only a brief intervention. This leads us to the conclusion that coaches can adopt two strategies to improve sport teams' motivational functioning. Coaches can either follow an intervention program to learn how to provide competence support more effectively^{24; 62} or they can use the power of their athlete leaders more effectively by encouraging them to provide competence support.

There might be alternative reasons why coaches did not have the same motivational impact as athlete leaders. First, although coaches did not directly affect team members'

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intrinsic motivation, they might have nurtured other, more controlled forms of motivation. For example, when a coach provides feedback to a player, that player might be motivated to exert effort to meet the expectations of the coach or to prove his worth and ability to the coach (i.e., extrinsic rather than intrinsic motivation). To the extent that coaches have primed these alternative types of motivation, they may have partially cancelled out the benefits of coach feedback on intrinsic motivation. In contrast, athlete leaders may have merely promoted their teammates' enjoyment and challenge seeking as such (i.e., intrinsic motivation). Future research could examine coaches' and athlete leaders' impact on a broader spectrum of motivational outcomes.

Second, one might argue that in regular sport settings coaches provide more frequent feedback than athlete leaders. While the coach feedback in this experiment may thus have been perceived as the norm (and athletes may have become less sensitive to its positive impact), the behavior displayed by the athlete leader in this experiment may have deviated more strongly from daily practice and therefore might have been experienced as 'refreshing' and intrinsically motivating. Research into stimulus novelty revealed that when people experience something new, they see it has a potential for rewarding them, which motivates them.⁶³ However, the brain learns that the stimulus, once familiar, has no reward associated with it and as a consequence loses its motivating potential. One counterargument for this reasoning is, though, that our manipulation check revealed that coaches only provided very little competence support in the baseline test. In addition, the increase in coaches' competence support during the experiment was similar as the increase observed for the athlete leaders.

A third potential reason for the larger motivational impact of athlete leaders might be that athletes are used to receive both positive, corrective, and negative feedback from their coaches. The invariantly positive feedback received in this study may have caused players to perceive the feedback to be less authentic. This perceived lack of authenticity could explain

its reduced effectiveness.⁶⁴ It should be noted, however, that at the end of the questionnaire we asked participants whether the behavior of the coach and the athlete leader was different during the test, compared to regular training sessions or competitive games. Participants in all experimental conditions indicated that both leaders did not behave differently during the experiment, thereby providing a counterargument for the less authentic feedback.

Although coaches did not affect the motivational pathway directly (as athlete leaders did), it should be noted that they were able to affect this motivational pathway in an indirect way through their impact on players' performance. More specifically, by providing competence support, coaches were able to influence players' accuracy, which in turn strengthened their competence satisfaction and their intrinsic motivation.

Strengths, Limitations, and Future Research

This study is part of a line of research experimentally evidencing the impact of leaders' competence support^{14; 22; 24; 61}. The main aim of this study was to see whether earlier observations would also hold in a more ecologically valid context (i.e., a context with a stronger external validity). In other words, we aimed to see whether results found in earlier research using confederates hold true when manipulating the behavior of the actual coach and athlete leader in existing teams. To ensure that all coaches and athlete leaders received exactly the same treatment, we adopted a very strict protocol for our intervention with limited room for confounding factors. In addition, we included complete teams instead of artificial teams of five players. Finally, we used a task that required a high level of interaction. Besides the ecological validity of the study's design, also its experimental nature constitutes a clear strength as it allows examining causality. Both for coaches and for athlete leaders, there are only very few studies examining the impact of competence support by means of an experimental study design.

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Despite the experimental design and its ecological validity, the present study also had a number of limitations. First, this study focused on one specific dimension of competence support (i.e., providing positive feedback). Although the study findings highlighted the role of athlete leaders in influencing teammates' competence satisfaction and their intrinsic motivation, coaches might have a more decisive role when it comes to other types of competence support, such as the providing task- and process-based feedback, creating structured environments and providing optimal challenges. Future research could provide more insight in this matter by investigating these other components of competence support.

Second, the intervention used in this study was only a short-term intervention to manipulate the behavior of the leaders (i.e., asking them to provide more positive feedback). A short intervention (about 2 minutes) may not suffice for coaches to alter their standard motivating style. Moreover, a strong deviation from their usual motivating style may be perceived as inauthentic or even awkward by athletes, such that the perceived behavioral changes do not translate into any motivational or performance benefits. Future research could examine whether the effectiveness of the intervention could be maximized by increasing the length of the intervention. In such a design, coaches and athlete leaders would receive a more in-depth training on how to provide competence support. As previous findings suggest, it can be expected in this case that also coaches would get a direct impact on players' motivational chain.²⁴

Third, given the limited duration of our intervention, this study only provides insight in the short-term effects on motivation and performance. An interesting avenue for future research would be to identify long-term effects of leaders' competence-supportive behavior on athletes' motivation and performance throughout a season. As Lewthwaite and Wulf²⁵ have suggested that motivational variables affect not only motor performance but also motor learning, future research could provide more insight in the impact of competence support on

performance (i.e., short-term improvement) and learning (i.e., long lasting improvement) by adopting a longitudinal design.

Fourth, we did not differentiate in the quality of feedback provided during the experiment. More specifically, coaches and athlete leaders received instructions on how to provide positive competence-supporting feedback, but we only tracked the quantity of feedback. We did thus not track the enthusiasm with which coaches and athlete leaders provided feedback or the tone of voice used to deliver the feedback (i.e., loud or silently). The work of Carpentier and Mageau⁶⁵ revealed that athletes' outcomes (i.e., well-being, self-esteem, need satisfaction, and performance) are better predicted by feedback quality, compared to the quantity of feedback. More recently, De Muynck et al.²³ emphasized the impact of both feedback's valence (i.e., positive or negative) and its style (i.e., autonomy-supportive or controlling) on players' need satisfaction.

Perspective

The present research demonstrates that positive competence support by both coaches and athlete leaders has a positive impact on team performance. However, these results also corroborate previous literature emphasizing the different impact of coaches and athlete leaders.^{32; 66} These differences could imply that coaches and athlete leaders might be best suited to fulfill different roles. Based on these findings, athlete leaders might be most effective when adopting a motivating role. Coaches, on the other hand, are better suited to enhance players' performance. Thus, an important message to coaches is to engage their athlete leaders to provide competence support, because coaches not only already have a wide range of leadership tasks, but also since their athlete leaders are actually better in some of these leadership tasks (e.g., motivating team members). This study has demonstrated that a very brief intervention (i.e., just asking them to provide more competence support) already has major motivational benefits for the team. In conclusion, the results of this experimental

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697 study suggest that a model of shared leadership, in which coaches engage their athlete leaders
698 to take up their responsibility in providing competence support, will be most effective to
699 foster the team's motivation and performance.

References

1. Zuber C, Zibung M, Conzelmann A. Motivational patterns as an instrument for predicting success in promising young football players. *J Sports Sci.* 2015; 33: 160-168.
2. Vink K, Raudsepp L, Kais K. Intrinsic motivation and individual deliberate practice are reciprocally related: Evidence from a longitudinal study of adolescent team sport athletes. *Psychol Sport Exerc.* 2015; 16: 1-6.
3. Ryan RM, Deci EL. Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *Am Psychol.* 2000; 55: 68-78.
4. Ryan RM, Deci EL. *Self-determination theory: Basic psychological needs in motivation, development, and wellness*: Guilford Publications 2017.
5. Vansteenkiste M, Niemiec CP, Soenens B. The development of the five mini-theories of self-determination theory: an historical overview, emerging trends, and future directions. *The Decade Ahead: Theoretical Perspectives on Motivation and Achievement*: Emerald Group Publishing Limited, 2010:105-165.
6. Cerasoli CP, Nicklin JM, Ford MT. Intrinsic motivation and extrinsic incentives jointly predict performance: A 40-year meta-analysis. *Psychol Bull.* 2014; 140: 980.
7. Gottfried AE. Academic intrinsic motivation in elementary and junior high school students. *J Educ Psychol.* 1985; 77: 631.
8. Gottfried AE. Academic intrinsic motivation in young elementary school children. *J Educ Psychol.* 1990; 82: 525.
9. Lepper MR, Corpus JH, Iyengar SS. Intrinsic and extrinsic motivational orientations in the classroom: Age differences and academic correlates. *J Educ Psychol.* 2005; 97: 184.
10. Ormrod J. Human learning . Upper Saddle River, NJ: Merrill. Prentice Hall, 2008.
11. Enoksen E. Drop-out rate and drop-out reasons among promising Norwegian track and field athletes: A 25 year study. 2011.

THE MOTIVATIONAL IMPACT OF LEADERS

- 725 12. Fan W, Wolters CA. School motivation and high school dropout: The mediating role of
726 educational expectation. *Br J Educ Psychol*. 2014; 84: 22-39.
- 727 13. Gillet N, Berjot S, Vallerand RJ, Amoura S. The role of autonomy support and motivation
728 in the prediction of interest and dropout intentions in sport and education settings. *Basic Appl*
729 *Soc Psych*. 2012; 34: 278-286.
- 730 14. Fransen K, Vansteenkiste M, Vande Broek G, Boen F. The competence-supportive and
731 competence-thwarting role of athlete leaders: An experimental test in a soccer context. *PLoS*
732 *ONE*. 2017: Manuscript accepted for publication, pending minor revisions.
- 733 15. White RW. Motivation reconsidered: The concept of competence. *Psychol Rev*. 1959; 66:
734 297-333.
- 735 16. Mouratidis A, Vansteenkiste M, Lens W, Sideridis G. The motivating role of positive
736 feedback in sport and physical education: Evidence for a motivational model. *J Sport Exerc*
737 *Psychol*. 2008; 30: 240-268.
- 738 17. Mageau GA, Vallerand RJ. The coach-athlete relationship: a motivational model. *J Sports*
739 *Sci*. 2003; 21: 883-904.
- 740 18. Curran T, Hill AP, Niemiec CP. A conditional process model of children's behavioral
741 engagement and behavioral disaffection in sport based on self-determination theory. *J Sport*
742 *Exerc Psychol*. 2013; 35: 30-43.
- 743 19. Vansteenkiste M, Sierens E, Goossens L, Soenens B, Dochy F, Mouratidis A, Aelterman
744 N, Haerens L, Beyers W. Identifying configurations of perceived teacher autonomy support
745 and structure: Associations with self-regulated learning, motivation and problem behavior.
746 *Learning and Instruction*. 2012; 22: 431-439.
- 747 20. Delrue J, Reynders B, Aelterman N, De Backer M, Decroos S, De Muynck G, Fontaine J,
748 Fransen K, Haerens L, Van Puyenbroeck S, Vande Broek G, Vansteenkiste M. Adopting a

THE MOTIVATIONAL IMPACT OF LEADERS

- 749 Helicopter-perspective towards Motivating and Demotivating Coaching: A Circumplex
750 Approach. *Manuscript in revision*. 2018.
- 751 21. Amorose AJ, Nolan-Sellers W. Testing the moderating effect of the perceived importance
752 of the coach on the relationship between perceived coaching feedback and athletes'
753 perceptions of competence. *Int J Sports Sci Sci Coach*. 2016; 11: 789-798.
- 754 22. Amorose AJ, Horn TS. Intrinsic motivation: Relationships with collegiate athletes'
755 gender, scholarship status, and perceptions of their coaches' behavior. *J Sport Exerc Psychol*.
756 2000; 22: 63-84.
- 757 23. De Muynck G, Vansteenkiste M, Delrue J, Aelterman N, Haerens L, Soenens B. The
758 effects of feedback valence and style on need satisfaction, self-talk, and perseverance among
759 tennis players: An experimental study. *J Sport Exerc Psychol*. 2017; 39: 67-80.
- 760 24. Fransen K, Boen F, Vansteenkiste M, Mertens N, Vande Broek G. The power of
761 competence support: The impact of coaches and athlete leaders on intrinsic motivation and
762 performance. *Scand J Med Sci Sports*. 2018; 28: 725-745.
- 763 25. Lewthwaite R, Wulf G. Social-comparative feedback affects motor skill learning. *Q J Exp*
764 *Psychol*. 2010; 63: 738-749.
- 765 26. Wulf G, Shea C, Lewthwaite R. Motor skill learning and performance: a review of
766 influential factors. *Med Educ*. 2010; 44: 75-84.
- 767 27. Wulf G, Chiviacowsky S, Lewthwaite R. Normative feedback effects on learning a timing
768 task. *Res Q Exerc Sport*. 2010; 81: 425-431.
- 769 28. Allen J, Howe BL. Player ability, coach feedback, and female adolescent athletes'
770 perceived competence and satisfaction. *J Sport Exerc Psychol*. 1998; 20: 280-299.
- 771 29. Loughhead TM, Munroe-Chandler KJ, Hoffmann MD, Duguay AM. Athlete leadership in
772 sport. In: Beauchamp MR, Eys MA, eds. *Group dynamics in exercise and sport psychology*.
773 2nd ed. New York, NY: Routledge, 2014:110-127.

THE MOTIVATIONAL IMPACT OF LEADERS

- 774 30. Fransen K, Vanbeselaere N, De Cuyper B, Vande Broek G, Boen F. The myth of the team
775 captain as principal leader: Extending the athlete leadership classification within sport teams.
776 *J Sports Sci.* 2014; 32: 1389-1397.
- 777 31. De Cuyper B, Boen F, Van Beirendonck C, Vanbeselaere N, Fransen K. When do elite
778 cyclists go the extra mile? Team identification mediates the relationship between perceived
779 leadership qualities of the captain and social laboring. *Int J Sport Psychol.* 2016; 47: 355-372.
- 780 32. Fransen K, Decroos S, Vande Broek G, Boen F. Leading from the top or leading from
781 within? A comparison between coaches' and athletes' leadership as predictors of team
782 identification, team confidence, and team cohesion. *Int J Sports Sci Sci Coach.* 2017; 12: In
783 press.
- 784 33. Loughhead TM, Fransen K, Van Puyenbroeck S, Hoffmann MD, De Cuyper B,
785 Vanbeselaere N, Boen F. An examination of the relationship between athlete leadership and
786 cohesion using social network analysis. *J Sports Sci.* 2016; 34: 2063-2073.
- 787 34. Morgan PBC, Fletcher D, Sarkar M. Defining and characterizing team resilience in elite
788 sport. *Psychol Sport Exerc.* 2013; 14: 549-559.
- 789 35. Fransen K, Haslam SA, Mallett CJ, Steffens NK, Peters K, Boen F. Is perceived athlete
790 leadership quality related to team effectiveness? A comparison of three professional sports
791 teams. *J Sci Med Sport.* 2017; 20: 800-806.
- 792 36. Fransen K, Haslam SA, Mallett CJ, Steffens NK, Peters K, Boen F. Leading from the
793 Centre: A Comprehensive Examination of the Relationship between Central Playing Positions
794 and Leadership in Sport. *PLoS ONE.* 2016; 11: Manuscript accepted for publication, pending
795 minor revisions.
- 796 37. Fransen K, Haslam SA, Steffens NK, Vanbeselaere N, De Cuyper B, Boen F. Believing in
797 us: Exploring leaders' capacity to enhance team confidence and performance by building a
798 sense of shared social identity. *J Exp Psych Appl.* 2015; 21: 89-100.

THE MOTIVATIONAL IMPACT OF LEADERS

- 799 38. Standage M, Duda JL, Ntoumanis N. A test of self-determination theory in school
800 physical education. *Br J Educ Psychol*. 2005; 75: 411-433.
- 801 39. Faul F, Erdfelder E, Lang A-G, Buchner A. G* Power 3: A flexible statistical power
802 analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods*.
803 2007; 39: 175-191.
- 804 40. Mouratidis A, Vansteenkiste M, Lens W. Beyond positive feedback: The effects of
805 competence support on autonomous motivation and adjustment in physical education. In:
806 Seghers J, Vangrunderbeek H, eds. *Physical education research: What's the evidence?*
807 Leuven: Acco, 2008:79-95.
- 808 41. Haslam SA, McGarty C. *Research methods and statistics in psychology*: Sage 2014.
- 809 42. Hatfield E, Cacioppo JT, Rapson RL. Emotional contagion. *Curr Dir Psychol*. 1993; 2:
810 96-100.
- 811 43. Norman S, Luthans B, Luthans K. The proposed contagion effect of hopeful leaders on the
812 resiliency of employees and organizations. *J Leadersh Organ Stud*. 2005; 12: 55-64.
- 813 44. Sy T, Cote S, Saavedra R. The contagious leader: Impact of the leader's mood on the
814 mood of group members, group affective tone, and group processes. *J Appl Psychol*. 2005:
815 90: 295-305.
- 816 45. Radel R, Sarrazin P, Legrain P, Wild TC. Social contagion of motivation between teacher
817 and student: Analyzing underlying processes. *J Educ Psychol*. 2010; 102: 577.
- 818 46. Chen B, Vansteenkiste M, Beyers W, Boone L, Deci EL, Van der Kaap-Deeder J, Duriez
819 B, Lens W, Matos L, Mouratidis A, Ryan RM, Sheldon KM, Soenens B, Van Petegem S,
820 Verstuyf J. Basic psychological need satisfaction, need frustration, and need strength across
821 four cultures. *Motiv Emot*. 2015; 39: 216-236.
- 822 47. Hooper D, Coughlan J, Mullen M. Structural equation modelling: Guidelines for
823 determining model fit. *Articles*. 2008; 2.

THE MOTIVATIONAL IMPACT OF LEADERS

- 824 48. Henk CM, Castro-Schilo L. Preliminary detection of relations among dynamic processes
825 with two-occasion data. *Struct Equ Modeling*. 2016; 23: 180-193.
- 826 49. Valente MJ, MacKinnon DP. Comparing models of change to estimate the mediated effect
827 in the pretest–posttest control group design. *Struct Equ Modeling*. 2017; 24: 428-450.
- 828 50. De Backer M, Boen F, Ceux T, De Cuyper B, Hoigaard R, Callens F, Fransen K, Vande
829 Broek G. Do perceived justice and need support of the coach predict team identification and
830 cohesion? Testing their relative importance among top volleyball and handball players in
831 Belgium and Norway. *Psychol Sport Exerc*. 2011; 12: 192-201.
- 832 51. Hagger MS, Chatzisarantis NL. *Intrinsic motivation and self-determination in exercise*
833 *and sport*: Human Kinetics 2007.
- 834 52. Dirks KT. Trust in leadership and team performance: Evidence from NCAA basketball. *J*
835 *Appl Psychol*. 2000; 85: 1004-1012.
- 836 53. Fransen K, Steffens NK, Haslam SA, Vanbeselaere N, Vande Broek G, Boen F. We will
837 be champions: Leaders' confidence in 'us' inspires team members' team confidence and
838 performance. *Scand J Med Sci Sports*. 2016; 26: 1455-1469.
- 839 54. Brophy J. Successful teaching strategies for the inner-city child. *The Phi Delta Kappan*.
840 1982; 63: 527-530.
- 841 55. Graham G, Heimerer E. Research on teacher effectiveness: A summary with implications
842 for teaching. *Quest*. 1981; 33: 14-25.
- 843 56. Boyce BA. The effects of three styles of teaching on university students' motor
844 performance. *J Teach Phys Educ*. 1992; 11: 389-401.
- 845 57. Cothran DJ, Kulinna PH. Students' perspectives on direct, peer, and inquiry teaching
846 strategies. *J Teach Phys Educ*. 2006; 25: 166-181.
- 847 58. Gielen S, Peeters E, Dochy F, Onghena P, Struyven K. Improving the effectiveness of
848 peer feedback for learning. *Learning and instruction*. 2010; 20: 304-315.

THE MOTIVATIONAL IMPACT OF LEADERS

- 849 59. Yang M, Badger R, Yu Z. A comparative study of peer and teacher feedback in a Chinese
850 EFL writing class. *J Second Lang Writ.* 2006: 15: 179-200.
- 851 60. Cotterill ST, Fransen K. Athlete leadership in sport teams: Current understanding and
852 future directions. *Int Rev Sport Exerc Psychol.* 2016: 9: 116-133.
- 853 61. Horn TS. Coaching effectiveness in the sport domain. In: Horn TS, ed. *Advances in sport*
854 *psychology*. Champaign, IL: Human Kinetics, 2008:239–267.
- 855 62. Reynders B, Van Puyenbroeck S, Decroos S, De Backer M, Delrue J, De Muynck G,
856 Aelterman N, Fransen K, Haerens L, Vansteenkiste M, Vande Broek G. Coaching the Coach:
857 Intervention Effects on Coaches' Need-Supportive Behavior and Athletes' Motivation and
858 Engagement. *Manuscript in revision.* 2018.
- 859 63. Bunzeck N, Düzel E. Absolute coding of stimulus novelty in the human substantia
860 nigra/MTA. *Neuron.* 2006: 51: 369-379.
- 861 64. Henderlong J, Lepper MR. The effects of praise on children's intrinsic motivation: a
862 review and synthesis. *Psychol Bull.* 2002: 128: 774.
- 863 65. Carpentier J, Mageau GA. When change-oriented feedback enhances motivation, well-
864 being and performance: A look at autonomy-supportive feedback in sport. *Psychol Sport*
865 *Exerc.* 2013: 14: 423-435.
- 866 66. Price MS, Weiss MR. Relationships among coach leadership, peer leadership, and
867 adolescent athletes' psychosocial and team outcomes: A test of transformational leadership
868 theory. *J Appl Sport Psychol.* 2013: 25: 265-279.
- 869

870

Appendix A**871 Visual Scheme**

872

This was the visual scheme used by the experimental leader to illustrate his

873

instructions on how to provide positive feedback, both at the individual and at the team level.

874

Feedback to team members	
Every time when they take a lay-up/shot...	
SCORE	MISS
<ul style="list-style-type: none"> - “Great job” - “Good shot” 	<ul style="list-style-type: none"> - “Keep your speed up” - “Let’s go, next action” - “You can do it! You’ll make it next time” - “No problem, your execution was good”
Feedback aan TEAM <ul style="list-style-type: none"> - “Good job team!” - “Great speed” - “Let’s keep this tempo up guys!” 	

875

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Appendix B

Script

Intro. The new team is gathered near the experiment leader.

Experiment leader: “Hi everybody, my name is //name experiment leader//. Your team has the chance to participate in a large project organized by ‘Flanders Basketball Talent’. We created norm tables based on the results of other basketball teams who have already completed this test. By also measuring your performance, we can see how you perform compared to the average basketball team of a similar age and playing level. This project is in collaboration with the University of Leuven, which is why you will have to fill out a short questionnaire twice throughout the test. You will execute the same exercise twice, during which you will have to pass, dribble, and score as a team. The goal is to complete this test to the best of your abilities as a team. This means that you will have to do it as fast as you can, but you will also have to score as much as you can, as each missed scoring opportunity will lead to a penalty of five seconds on your execution time. Before we start, I will give you all a basketball shirt from the University of Leuven. //name best athlete leader// gets number 1, you get number 2; you get number 3, etc. (until every player has a shirt).”

No leader is formally appointed in this phase, but we ensured that the player who is regarded as the best athlete leader receives the shirt with number 1. As such, we can easily track the amount of positive feedback the leader provides. Also, the numbering of the players facilitates the tracking of their individual performance throughout the exercise.

Experiment leader: “I will first explain the exercise in detail. As you can see, a lot of cones are positioned on the field where your team will perform the test of Flanders Basketball Talent. We will start with a demonstration. The player with number 1 has a ball and starts at the cone near the center circle. The player with number 2 stands behind the cones over there. The player with number 3 positions himself on the right side of the rim with a ball. The player

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with number 4 stands on the right side of the court, near the cone on the sideline. All the other players position themselves behind player number 4. Player 1 starts by passing the ball to Player 4. The ball is immediately passed to Player 3, who in turn passes it back to Player 1 to perform a lay-up. If you are left handed, you can make your lay-up on the left side of the ring. Player 1 then receives a new ball from Player 2 and has to dribble along the cones. Player 1 passes the starting point and attempts to score with a free-throw. During the actions of Player 1, every other player in the field rotates counter-clockwise. More specifically, Player 4 replaces Player 3, who takes the rebound for the lay-up and replaces Player 2. Player 2 goes to the starting position and can start the task as soon as the shot of Player 1 hits the board or rim. After Player 1 has finished his round, he gets in line behind the last player. We will first walk through the entire exercise, so everybody understands the rotation and execution. Afterwards we will do a practice round.”

During the walkthrough and the practice round, the experiment leader corrects mistakes, guides players, and ensures that everybody fully understands the exercise.

Pretest. The experiment leader starts the actual experimental test.

Experiment leader: “Is everybody ready? We will now start the official competition. As I explained, this competition consists of two tests. After each test you will fill out a short questionnaire. One test involves that your entire team completes the exercise 10 times. In other words, you all have to complete 10 rounds. Your team’s score will be determined based on the time your team needs to complete this exercise. However, as you will receive five seconds penalty time for each lay-up or shot that you miss, it is important to be both fast and accurate. If anybody loses the ball, one of the players waiting in line can throw them a new ball, so you don’t have to waste time chasing your lost ball. Good luck! Is everybody ready? 3...2...1...GO!”

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During the test, the experiment leader has two tasks. First, he tracks the amount of positive feedback Player 1 (i.e., the athlete leader) provides. Second, he informs the players on the amount of rounds the team still has to perform:

“Every player has to complete the exercise 9 more times.

Every player has to complete the exercise 8 more times.

Every player has to complete the exercise 7 more times.

Every player has to complete the exercise 6 more times.

Every player has to complete the exercise 5 more times.

Every player has to complete the exercise 4 more times.

Every player has to complete the exercise 3 more times.

Every player has to complete the exercise 2 more times.

Every player has to complete the exercise 1 more time.”

The experiment assistant keeps track of each player’s scores and their individual completion time for each round. Each player’s time starts when the ball of the previous player hits the ring/board and ends when his own ball hits the ring/board. By timing the entire team and writing down the exact time whenever a ball hits the ring/board, we are able to calculate each player’s individual time for each round afterwards.

After the final player finishes the exercise for the 10th time, the experiment leader gathers the team.

Experiment leader: “Stop! Ok, that concludes the first test of the competition. You are halfway, but before we complete the second test of the competition, you should fill out a short questionnaire. Your answers are strictly confidential and will never be shown to other players or you coach. Please fill out this questionnaire honestly. If you are done, you can come back here.”

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The experiment leader ensures that every player can fill out his questionnaire privately by placing them far enough away from each other. When Player 1 is ready the coach asks him to gather all the balls near the center circle.

While the pretest serves as baseline and is similar for the three conditions, the script for the posttest differs according to the experimental condition. We outline each of the three scripts.

Posttest: coach condition. When the players are filling out the questionnaire, the experiment leaders asks the coach to provide positive feedback, both at the individual and at the team level. In the meantime, the experiment assistant is standby for the players who are filling out the questionnaire and answers questions if necessary.

Experiment leader: “As you are the coach of this team, you undoubtedly have the greatest impact on your players. I would like to ask you to show this during the next test by providing positive feedback, almost in an extreme manner. You can see how you can provide positive feedback on this scheme.”

At this point, the experiment leader shows the coach the visual scheme as outlined in Appendix A.

Experiment leader: “Every time when a player scores a shot, you should provide them with a compliment such as ‘great job!’ or ‘good shot!’ If a player misses a lay-up or shot, you should support them, for example by saying ‘no problem, you will make it next time!’ Finally, you should also try to encourage the entire team with positive feedback. A good example would be ‘Keep going, we are definitely going to be the fastest team if we keep this up!’ Is everything clear to you? With respect to the frequency of feedback, I would like to ask you to provide feedback to each player performing the exercise at least once every round and to provide feedback to the entire team at least once every five rounds.”

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The experiment leader ensures that the coach fully understands what we are expecting, asks him to repeat what we are asking of him, and then gathers the team for the second test.

Experiment leader: “We will now start the second test. Again, this test involves that your entire team completes the exercise 10 times, meaning that every player completes 10 rounds. Your team’s score will be determined based on the time you need as a team to complete this test. However, as you will receive five seconds penalty time for each lay-up or shot that you miss, it is important to be both fast and accurate. If anybody loses their ball, one of the players waiting in line can throw them a new ball, so you don’t have to waste time chasing your lost ball. Good luck! Is everybody ready? 3...2...1...GO!”

During the second test, the experiment leader has three tasks. First, he reminds the coach of his task to provide positive feedback if necessary. Second, he tracks the amount of positive feedback the coach and Player 1 (i.e., the athlete leader) provide. Third, he informs the players on the amount of rounds the team still has to perform:

“Every player has to complete the test 9 more times.

Every player has to complete the test 8 more times.

Every player has to complete the test 7 more times.

Every player has to complete the test 6 more times.

Every player has to complete the test 5 more times.

Every player has to complete the test 4 more times.

Every player has to complete the test 3 more times.

Every player has to complete the test 2 more times.

Every player has to complete the test 1 more time.”

The experiment assistant keeps track of each player’s scores and their individual time needed to complete their round. Each player’s time starts when the ball of the previous player hits the ring/board, and ends when his own ball hits the ring/board. By timing the entire team

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999 and writing down the exact time whenever a ball hits the ring/board, we were able to calculate
1000 each player's individual round times afterwards.

1001 After the final player finishes the test for the 10th time, the experiment leader gathers
1002 the team to fill out the final questionnaire and ends the 'competition'.

1003 **Posttest: athlete leader condition.** As soon as the athlete leader (i.e., Player 1) is
1004 ready filling out the first questionnaire, the experiment leaders asks him to provide positive
1005 feedback, both at the individual and at the team level. In the meantime, the experiment
1006 assistant is standby for the players who are filling out the questionnaire and answers questions
1007 if necessary.

1008 *Experiment leader:* “//name athlete leader//, the questionnaires we took last week
1009 revealed that your teammates perceive you as being the best leader on the field. They look to
1010 you for motivating them on the field. I would like to ask you to show this during the next test
1011 by providing positive feedback, almost in an extreme manner. You can see how you can
1012 provide positive feedback on this scheme.”

1013 At this point, the experiment leader shows the athlete leader the visual scheme as
1014 outlined in Appendix A.

1015 *Experiment leader:* “Every time when a player scores a shot, you should provide them
1016 with a compliment such as ‘great job!’ or ‘good shot!’ If a player misses a lay-up or shot, you
1017 should support them, for example by saying ‘no problem, you will make it next time!’ Finally,
1018 you should also try to encourage the entire team with positive feedback. A good example
1019 would be ‘Keep going, we are definitely going to be the fastest team if we keep this up!’ Is
1020 everything clear to you? With respect to the frequency of feedback, I would like to ask you to
1021 provide feedback to each player performing the exercise at least once every round and to
1022 provide feedback to the entire team at least once every five rounds.”

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1023 The experiment leader ensures that the athlete leader fully understands what we are
1024 expecting, asks him to repeat what we are asking of him, and then gathers the team for the
1025 second test.

1026 *Experiment leader:* “Based on the questionnaire you all filled out last week, we found
1027 that you all perceive //name athlete leader// as best leader of this team. Therefore, // name
1028 athlete leader // will ensure during this test that you as a team will perform even better. We
1029 will now start the second test. Again, this test involves that your entire team completes the test
1030 10 times, meaning that every player completes 10 individual rounds. Your team’s score will
1031 be determined based on the time your team needs to complete this test. However, as you will
1032 receive five seconds penalty time for each lay-up or shot that you miss, it is important to be
1033 both fast and accurate. If a player loses his ball, one of the players waiting in line can throw in
1034 a new ball, so you don’t have to waste time chasing your lost ball. Good luck! Is everybody
1035 ready? 3...2...1...GO!”

1036 During the second test, the experiment leader has three tasks. First, he reminds the
1037 athlete leader of his task to provide positive feedback if necessary. Second, he tracks the
1038 amount of positive feedback provided by the coach and by Player 1 (i.e., the athlete leader).
1039 Third, he informs the players on the amount of rounds the team still has to perform:

1040 “Every player has to complete the test 9 more times.

1041 Every player has to complete the test 8 more times.

1042 Every player has to complete the test 7 more times.

1043 Every player has to complete the test 6 more times.

1044 Every player has to complete the test 5 more times.

1045 Every player has to complete the test 4 more times.

1046 Every player has to complete the test 3 more times.

1047 Every player has to complete the test 2 more times.

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1048 Every player has to complete the test 1 more time.”

1049 The experiment assistant keeps track of each player’s scores and their individual
1050 rounds time. Each player’s time starts when the ball of the previous player hits the ring/board
1051 and ends when his own ball hits the ring/board. By timing the entire team and writing down
1052 the exact time whenever a ball hits the ring/board, we were able to calculate each player’s
1053 individual round times afterwards.

1054 After the final player finishes the test for the 10th time, the experiment leader gathers
1055 the team to fill out the final questionnaire and ends the ‘competition’.

1056 **Posttest: control condition.** As soon as the athlete leader (i.e., Player 1) is ready
1057 filling out the first questionnaire, the experiment leaders asks him to place three balls in the
1058 center circle as reserve. In the meantime, the experiment assistant is standby for the players
1059 who are filling out the questionnaire and answers questions if necessary.

1060 *Experiment leader:* “We will now start the second test. Again, this test involves that
1061 your entire team completes the test 10 times, meaning that every player completes 10
1062 individual rounds. Your team’s score will be determined based on the time your team needs to
1063 complete this test. However, as you will receive five seconds penalty time for each lay-up or
1064 shot that you miss, it is important to be both fast and accurate. If a player loses his ball, one of
1065 the players waiting in line can throw in a new ball, so you don’t have to waste time chasing
1066 your lost ball. Good luck! Is everybody ready? 3...2...1...GO!”

1067 During the second test, the experiment leader has two tasks. First, he tracks the
1068 amount of positive feedback the coach and player 1 (i.e., the athlete leader) provides. Second,
1069 he informs the players on the amount of rounds the team still has to perform:

1070 “Every player has to complete the test 9 more times.

1071 Every player has to complete the test 8 more times.

1072 Every player has to complete the test 7 more times.

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1073 Every player has to complete the test 6 more times.

1074 Every player has to complete the test 5 more times.

1075 Every player has to complete the test 4 more times.

1076 Every player has to complete the test 3 more times.

1077 Every player has to complete the test 2 more times.

1078 Every player has to complete the test 1 more time.”

1079 The experiment assistant keeps track of each player’s scores and their individual round
1080 time. Each player’s time starts when the ball of the previous player hits the ring/board, and
1081 ends when his own ball hits the ring/board. By timing the entire team and writing down the
1082 exact time whenever a ball hits the ring/board, we were able to calculate each player’s
1083 individual time afterwards.

1084 After the final player finishes the test for the 10th time, the experiment leader gathers
1085 the team to fill out the final questionnaire and ends the ‘competition’.

1086 **End.** The experiment leader gathers the team.

1087 *Experiment leader:* “Stop! Ok, that concludes the second half of the competition.
1088 Please fill out the second, short questionnaire. Your answers are strictly confidential and will
1089 never be shown to the other players or your coach. Please fill out this questionnaire honestly
1090 and take your time. If you are done, you can come back here. Thank you very much for your
1091 cooperation!”

1092