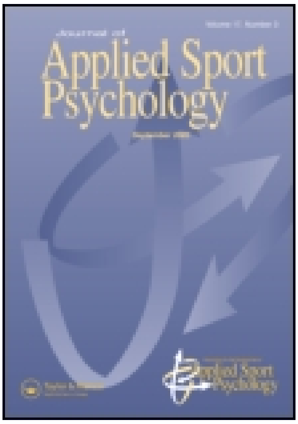

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Antonis Hatzigeorgiadis [a], Evangelos Galanis [a], Nikos Zourbanos [a] & Yannis Theodorakis [a]
[a] University of Thessaly
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Self-talk and Competitive Sport Performance

ANTONIS HATZIGEORGIADIS, EVANGELOS GALANIS, NIKOS ZOURBANOS, AND YANNIS THEODORAKIS

University of Thessaly

The purpose of the present study was to test the effectiveness of a 10-week self-talk intervention on competitive performance in young swimmers. Participants were 41 swimmers (*M* age 14.59, *SD* = 1.58 years), whose performance was recorded on 2 competitive occasions with a 10-week interval. In-between the 2 competitions, participants in the intervention group followed a self-talk training program. The results showed that the intervention group had greater performance improvements than the control group, thus, supporting the effectiveness of the program in enhancing sport performance in a competitive environment. The findings provide directions for the development of effective self-talk interventions.

The effectiveness of self-talk strategies in sport has been receiving increasing research attention in recent years. Self-talk strategies are based on the use of cues that aim at facilitating learning and enhancing performance, through the activation of appropriate responses. Such strategies have been implemented in a variety of motor and sport tasks ranging from fine (Van Raalte et al., 1995) to gross (Hamilton, Scott, & MacDougall, 2007), with participants varying from school (Kolovelonis, Goudas, & Dermitzaki, 2011) and university students (Hatzigeorgiadis, Theodorakis, & Zourbanos, 2004), to beginner (Perkos, Theodorakis, & Chroni, 2002) and experienced athletes (Landin & Hebert, 1999). In addition, a variety of interventions have been implemented, ranging from cross-sectional (Malouff, McGee, Halford, & Rooke, 2008) to multi-week interventions (Perkos et al., 2002), and several experimental designs have been applied, such as pre-test post-test randomized groups (Hatzigeorgiadis et al., 2004), or single-subject multiple baseline designs (Johnson, Hrycaiko, Johnson, & Halas, 2004). Overall, the results have provided support for the effectiveness of self-talk strategies for improving task performance.

A recent meta-analysis (Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011) more emphatically stressed the effectiveness of self-talk interventions in sport. An overall effect size of 0.48 was identified, indicating that self-talk can meaningfully facilitate learning and enhance performance in sport tasks. Furthermore, a number of potential moderators were examined with regard to the characteristics of the task, participants, type of self-talk, and intervention. The results revealed that (a) self-talk was more effective for tasks requiring fine skills, such as precision and accuracy, rather than tasks requiring gross skills, such as strength and endurance; (b) self-talk was more effective in novel rather than in well-learned tasks; (c) interventions including training of self-talk were more effective than intervention where no

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Address correspondence to Antonis Hatzigeorgiadis, University of Thessaly, Department of Physical Education & Sport Sciences, Trikala, 42100 Greece. E-mail: ahatzi@pe.uth.gr

training was implemented. In addition, the results provided partial support for the type of task by type of self-talk matching hypothesis (Theodorakis, Weinberg, Natsis, Douma, & Kazakas, 2000), indicating that for fine tasks instructional self-talk was more effective than motivational self-talk; moreover, instructional self-talk was more effective for fine tasks compared to gross tasks. Overall, the results of the meta-analysis provided robust evidence for the effectiveness of self-talk interventions in the sport field.

Reviewing the self-talk literature, Theodorakis et al. (2012) classified self-talk interventions in relation to the characteristics of the settings and the tasks that have been used. They identified the lack of studies testing the effectiveness of self-talk strategies on competitive performance, and stressed the need for the implementation of such field interventions. There are four levels at which self-talk interventions implemented to athletes can be classified: (a) interventions testing the effectiveness of self-talk on fundamental motor tasks in lab or field settings, such as vertical jump (Edwards, Tod, & McGuigan, 2008), and cycling tasks (Hamilton et al., 2007); (b) interventions on the effectiveness of self-talk on performance components of different sports, such as basketball shooting (Perkos et al., 2002), and forehand drive in tennis (Hatzigeorgiadis, Zourbanos, Goltsios, & Theodorakis, 2008); (c) interventions testing self-talk strategies on sport performance in non-competitive context (unofficial timings or experimentally induced events), such as 100 m. sprinting performance (Mallett & Hanrahan, 1997), and middle distance running performance (Weinberg, Miller, & Horn, 2012); (d) interventions investigating the effectiveness of self-talk strategies on competitive sport performance (Schüler & Langens, 2007).

Despite the increasing volume of research in self-talk, research for the last two levels has been very sparse. Regarding sport performance in non-competitive settings, Mallett and Hanrahan (1997) tested the effectiveness of a self-talk intervention in young elite sprinters, using a single-subject multiple-baseline design. A race plan was developed corresponding at the different parts of a 100-m race. The results showed that participants improved their times by approximately 2.3%, which was evaluated as a considerable improvement for that level of athletes. In a recent attempt to test the effectiveness of self-talk in simulated competition, Weinberg et al. (2012) organized two cross-country running events with collegiate athletes. Their results showed that a self-talk intervention based on the use of recorded instructions improved performance from pre- to post-intervention over a week. In both studies performance was assessed in conditions or events organized by the researchers.

With regard to competitive sport performance in real competition we are only aware of the study by Schüler and Langens (2007). In this study the authors tested the use of self-talk strategies as a means for buffering against the negative effects of psychological crisis that occur during a marathon race in non-professional runners. They reported that among runners who experienced a large psychological crisis, those using self-talk coped better than those in a control group. Participants in this study did not receive any training with regard to the use of self-talk. They were asked to create their own self-talk cues and use them at the point at which the psychological barrier of "the wall" appears in marathon runners. In addition, this study was partly based on retrospective self-reports obtained after the race. Nevertheless, this study provided useful preliminary evidence regarding the effectiveness of self-talk on competitive sport performance.

An earlier attempt to investigate the effectiveness of a self-talk intervention on competitive performance was made by Landin and Hebert (1999). They applied a single-subject multiple-baseline design on a sample of five tennis players and assessed experimentally volleying skills. Subsequently, to complement these experimental data with field data, they assessed frequency of net approaches during matches. Due to the competitive schedule, data were only collected for three players on a limited number of occasions. Descriptive analysis showed small to moderate increases in net approaches, nonetheless the outcome of the moves was not evaluated. This study highlights the difficulties researchers face when testing the effectiveness of interventions in naturalistic field settings.

The demands placed on athletes in training and competitions are different both physically and psychologically. Competitive settings are different from training on a number of features, such as the environment, the behavior of the coach, teammates and opponents, the presence of spectators, the importance attached to the occasion, and subsequent cognitive and affective responses. Martin, Vause, and Schwartzman (2005) argued that although studies in non-competitive conditions can provide guidance for performance-enhancing strategies, it cannot be assumed that such results can transfer to the competitive environment. They concluded that we will only have confidence in such findings if performance of real athletes in real competitions is examined and the effectiveness of such interventions is experimentally supported. The purpose of the present study was to extend this line of research and investigate the effectiveness of a self-talk intervention program, including training of self-talk, on competitive sport performance in young swimmers.

The intervention was developed based on two key principles stemming from the existing self-talk literature, but also considering some theoretical underpinnings. The first important issue was the implementation of appropriate and adequate training. Training the self-talk routines has proven mostly crucial in maximizing the effectiveness of the strategy. The results from the relevant meta-analysis (Hatzigeorgiadis et al., 2011) demonstrated a clear effect for the implementation of practice sessions aiming to get participants familiar with the use of self-talk. Considering that in the self-talk literature, a significant number of studies involve students and beginner athletes, for whom there is more room for improvement in task performance compared to more experienced athletes, the need for training self-talk seemed even greater to achieve a meaningful performance effect. Therefore an extended and systematic training plan was deemed essential.

The second issue that was considered was the involvement of the athletes in developing the self-talk plans. According to the self-determination theory (Deci & Ryan, 1985) perceptions of autonomy, reflected in the options and choices that individuals feel they have over decisions and actions, will result in increased intrinsic interest and enhanced motivation. Based on these premises, Hardy (2006) argued that especially in naturalistic sport settings providing athletes the opportunity to develop and use self-determined self-talk plans will maximize the motivational effects regarding the use of the strategy. Rushall, Hall, Roux, Sasseville, and Rushall (1988) tested the effectiveness of self-determined cues in elite skiers and reported important performance increases. However, their study did not involve a direct comparison between assigned and self-determined cues. Weinberg et al. (2012) attempted a direct comparison between assigned and self-determined self-talk in a naturalistic setting. Their results showed no consistent differences between the self-talk groups. However, it should be noted that participants received the experimental treatment on the day of the event, thus, had no training using self-talk; in addition, the statements were recorded and heard before the onset of the competition, as a pre-competition strategy. Based on the above premises, the intervention was developed to optimize the effectiveness of the self-talk strategy. First, a training period would be applied to enhance the understanding of athletes for the self-talk strategy and get them acquainted with the use of self-talk; then athletes would be encouraged to develop their individual self-determined plans; finally a period of training using the self-determined self-talk to optimize the application and effectiveness of self-talk plans would be implemented.

Finally, a matching effect with regard to the development of self-determined self-talk plans was anticipated. Theodorakis et al. (2000) introduced the task demands by self-talk type matching hypothesis. They argued that instructional self-talk should be more beneficial for relatively fine tasks because instructional self-talk may be more effective in regulating attentional processes, and for such task performance can benefit more from increased attention compared to gross tasks. In contrast, they claimed that motivational self-talk should be more beneficial for relatively gross tasks, because motivational self-talk may be more appropriate for psyching-up and maximizing effort, and for such tasks physical effort may be more influential to performance compared to fine tasks. This hypothesis has received reasonable, but not full, support in experimental studies (e.g., Edwards et al., 2008; Hatzigeorgiadis et al., 2004) and the relevant meta-analysis (Hatzigeorgiadis et al., 2011). In this study, the matching hypothesis principle was further considered, under the light of the conscious processing hypothesis (Masters, 1992). According to the conscious processing hypothesis an explicit approach to the execution of automated, mastered performance can have detrimental performance effects. Expert performance can be harmed when movements are consciously controlled because this is proceduralized or automated with extended practice, especially in high pressure situations (Beilock & Carr, 2001). Considering participants' competitive experience, but also the competitive setting, it was expected that participants would prefer developing their competition plans based primarily on motivational cues as more appropriate to increase confidence and maximize effort (Hatzigeorgiadis et al., 2009; Theodorakis, Hatzigeorgiadis, & Chroni, 2008) rather than explicit instructional cues aiming at providing performance instructions. Nevertheless, such an approach was not imposed or promoted to strengthen the autonomous functioning of participants in developing their self-talk plans; it was rather expected that participants would themselves choose to develop their self-talk plans based on motivational rather than instructional self-talk cues. Based on the effectiveness of self-talk interventions in non-competitive settings, and most importantly on the extended and individually tailored self-talk training intervention that was applied, our hypothesis was that the use of self-talk plans stemming from the intervention would improve competitive performance.

METHOD

Participants

Originally, 55 young swimmers were sampled. Participants were members of different swimming teams training in different swimming pools. The teams were randomly assigned as experimental ($n = 29$ swimmers) and control ($n = 26$ swimmers). For the intervention group 27 swimmers completed the intervention and two withdrew before the conclusion of the intervention due to injury. Among the remaining 27 swimmers, three did not participate in the post-intervention competition, and three competed in swimming events different than those in the pre-intervention competition; these swimmers were removed from the sample because performance changes could not be evaluated. As a result, the intervention group finally consisted of 21 swimmers. For the control group, four swimmers did not participate in the post-intervention competition and two competed in swimming events different than those in the pre-intervention competition. As a result the control group finally consisted of 20 participants.

For the 41 swimmers (22 male, 19 female) who were included in the study, the mean age was 14.52 ($SD = 1.23$; ranging from 13 to 16) years, the mean swimming experience was 8.09 ($SD = 2.24$) years, and the mean competitive experience was 5.55 ($SD = 1.35$) years. Participants were training between 5 and 6 days per week ($M = 5.83$, $SD = .38$ days) for an average of 11.50 ($SD = 1.09$) hours. Finally, 26 swimmers were specialized in sprints, whereas

15 in middle- and long-distance events. Among them 19 had experience of local/regional competitions and 22 of national competitions. No significant differences were identified between the intervention and the control groups in any of the above demographic variables: for age, $t\ (39) = 1.77, p = .08$; for swimming experience, $t\ (39) = 1.55, p = .13$; for competitive experience, $t\ (39) = 1.74, p = .09$; for training days per week, $t\ (39) = 1.17, p = .25$; and for training hours per week, $t\ (39) = 1.22, p = .23$. In addition, chi-square showed no differences in the number of male and female swimmers for the two groups, $\chi^2\ (1) = 1.18, p = .35$, level of competition, $\chi^2\ (1) = 2.02, p = .22$, and swimming specialization, $\chi^2\ (1) = 1.19, p = .34$. Finally, none of the participants had prior experience of psychological skills training.

Measures

Performance

Because swimmers participated (between them) in different events it was not possible to compare pre-intervention swimming times to post-intervention swimming times. Thus, performance was evaluated based on the improvement participants showed from pre- to post-intervention competitions. Participants' times were obtained from the official competition results. Subsequently, percentage of improvement was calculated ([post-intervention time–pre-intervention time] × 100 / pre-intervention time), with positive scores indicating improved performance (Bennett & Briggs, 2005).

In addition, it was considered useful to check the effectiveness of the intervention outside the competitive context through a more standardized assessment. For that purpose, timings in a 50 m freestyle pre-competition test were conducted two days prior to the baseline and final competitions for all swimmers. This test was described to participants as an important progress test for the competition.

Manipulation checks

Several checks were used to support the integrity of the experimental procedures. First, participants' intensity of pre-competition anxiety and perceived importance of competition was assessed to test for differences in participants' reactions and perceptions for the two competitions. Pre-competition anxiety was assessed with the cognitive and somatic anxiety scales from the revised CSAI-2 (Cox, Martens, & Russell, 2003). Cronbach's alphas for the pre-intervention competition were .79 for somatic and .70 for cognitive anxiety, and for the post-intervention competition .81 and .75 respectively. Perceived importance was assessed with two items asking participants how important and how crucial the competition was on a 10-item scale ranging from 1 (*not at all*) to 10 (*very much*). The correlations between the two items for the two competitions were .82 and .93. The scores for the two items were averaged.

Participants' use of self-talk in the supervised training sessions was also recorded. After the completion of each self-talk training set, participants were asked to indicate on a 10-point scale the degree to which they used the agreed cues. A similar check was applied for the post-intervention competition. In particular, participants were asked (a) to indicate whether they used their self-talk plan; (b) to report whether they used any other self-talk cues; (c) if so, what these cues were; and (d) if so, the degree to which they used these other cues 1 (*not at all*) to 10 (*all the time*). Finally, participants in the control group were also asked to report on their self-talk in the post-intervention competition. In particular, they were informed that athletes frequently say things to themselves while performing and were asked to indicate (a) whether they systematically used any form of self-talk during the competition; (b) if so, what was that; (c) if so, to what degree 1 (*not at all*) to 10 (*all the time*).

Procedures and Intervention

The study was approved by the institution's ethics committee. Teams and coaches were contacted and asked to participate in the program. Coaches were briefed with regard to the purposes of the study and gave their permission. Participants were then informed about the purpose of the program and the consent of their coaches. They were also told that participation was voluntary and that they could withdraw without any consequences anytime they wished. Finally, before the onset of the study, informed consent was signed by participants' parents.

Experimental group

In the introductory meeting participants were given a short presentation on self-talk and how the intervention was going to work. They were also told that it would be important to attend all the training sessions according to their schedule.

The practicing of self-talk under supervision was implemented in the main swimming set of each training session three times per week. However, swimmers were encouraged to use self-talk for the remaining sets of the session if they wished to, but also for the remaining training sessions they were attending during the week. For the three weekly supervised sessions, a daily plan was prepared for each swimmer, each week for the first 8 weeks.

At the beginning of each session swimmers were briefed in groups with regard to the purpose and the content of the session. Then, the individual plan was communicated to each swimmer just before the start of the training session, and they were again reminded of it before the start of the main swimming set. Participants were informed what cue words to use, when and how often these cues should be used, and the purpose of each cue. In addition, a piece of paper with the self-talk cues was placed at each swimmer's lane just before the start of the main set (an example of a personal daily training plan is displayed in the Appendix). After the completion of the main set, participants were asked in each session how frequently during the set they were using the cues that they were instructed to use. The same researcher implemented all the intervention sessions from start to finish and was there to advise the swimmers throughout the program.

Overall, the purpose of the program was to have the athletes understanding, learning, and practicing how to use the self-talk technique thoroughly, so that they could effectively develop their own competitive self-talk plan. Over the two first weeks participants practiced motivational self-talk. During this period, and in cooperation with the coach, technical aspects of the stroke that could be improved through the use of instructional self-talk in each swimmer's style were identified; the purpose was to develop appropriate instructional self-talk cues for each swimmer for the following weeks. Based on these discussions the researcher along with the coach came up with individually tailored instructional self-talk for each swimmer. These self-talk cues were subsequently practiced for the following 2 weeks (Weeks 3–4). For the 4 weeks that followed (Weeks 5–8) swimmers practiced a combination of instructional and motivational cues. During this period they were repeatedly instructed to identify the cues they thought were mostly helpful for them, either from the ones that were previously used, or new cues they thought would help them most. At the end of these four weeks, swimmers were asked to come up with a self-talk competition plan and were provided ideas of combinations they could use for the competition. In addition, they were asked to adopt a self-talk plan for the timing prior to the competition. For the last 2 weeks (Weeks 9–10) swimmers practiced the self-talk plans they had designed.

Control group

Participants in the control group were also informed that their performance for the two competitions would be recorded to evaluate the progress they had made. It was also stressed to them that it is important to attend all the training sessions according to their schedule. After the conclusion of the study, participants of the control group were debriefed and offered to attend the intervention program.

RESULTS

Manipulation Checks

Competition importance and anxiety

A two-way (2 × 2) ANOVA with one repeated factor (time) and one independent factor (group) was performed to test for differences between the baseline and final competition in perceived competition importance for the two groups. The statistical assumptions for normality and homogeneity were met. The analysis revealed a non-significant main effect for time, Pillai's Trace = .01, F (1, 39) = 0.28, p = .59, partial η^2 = .01, observed power = .08, and a non-significant group by time interaction, Pillai's Trace = .00, F (1, 39) = 0.01, p = .93, partial η^2 = .00, observed power = .05. A two-way (2 × 2) MANOVA with one repeated factor (time) and one independent factor (group) was performed to test for differences in somatic and cognitive anxiety between baseline and final competition for the two groups. The statistical assumptions for normality and homogeneity were met. The analysis revealed a non-significant multivariate main effect for time, Pillai's Trace = .00, F (1, 38) = 0.02, p = .99, partial η^2 = .00, observed power = .05, and a non-significant group by time interaction, Pillai's Trace = .08, F (1, 38) = 1.72, p = .19, partial η^2 = .08, observed power = .34. The descriptive statistics for the above analyses are presented in Table 1.

Use of self-talk in training and competition

The mean score for the use of self-talk in training was 7.51 (SD = 0.83), suggesting that athletes made adequate use of the self-talk cues. For the competition, 18 participants in the intervention group reported adhering to their self-talk plan at 100%, 2 participants at 67% (used two of the three cues they had planned), and one participant at 33% (used one of the three cues she had planned). Finally, two of the participants in the intervention group reported using an additional motivational self-talk cue. For the control group, one participant reported singing, and three participants reported using positive self-talk cues in a non-systematic way (frequency ranging from 2 to 3).

Table 1
Descriptive Statistics for the Pre-competition Variables for the Two Groups

	Experimental group				Control group			
	Competition 1		Competition 2		Competition 1		Competition 2	
	M	SD	M	SD	M	SD	M	SD
Competition importance	7.83	1.40	7.70	2.06	7.05	1.95	6.85	2.14
Cognitive anxiety	2.07	0.59	2.10	0.66	2.00	0.61	1.96	0.53
Somatic anxiety	2.05	0.73	1.91	0.60	1.84	0.52	1.95	0.57

Self-Talk Plans

With regard to the self-talk plans developed by participants in the intervention group, seven participants used one self-talk cue, five participants used two self-talk cues, and nine participants three self-talk cues. Also, 18 participants used motivational self-talk only, one participant used instructional self-talk only, and two participants used a combination of instructional and motivational self-talk.

50 m Timings

A *t* test was initially performed to test for differences in the baseline timings between the intervention and the control groups. The analysis showed no significant differences between the two group at baseline, $t\ (39) = 1.73$, $p = .09$. Subsequently, a two-way (2×2) ANOVA with one repeated factor (time) and one independent factor (group) was performed to test for changes in performance for the 50 m. freestyle timings for the two groups. The statistical assumptions for normality and homogeneity were met. The analysis revealed a significant time by group interaction effect, Pillai's Trace = .34, $F\ (1, 39) = 20.13$, $p < .01$, partial $\eta^2 = .34$, observed power = .99. Examination of the pairwise comparisons revealed that performance of the intervention group improved ($M_{pre} = 32.06$, $SD = 3.28$, $M_{post} = 31.52$, $SD = 3.00$; $p < .01$), whereas performance of the control group did not change significantly ($M_{pre} = 30.45$, $SD = 2.67$, $M_{post} = 30.61$, $SD = 2.64$; $p = .15$).

Competitive Performance

A *t* test was performed to test for differences in percentage of performance change between the intervention and the control groups. The statistical assumptions for normality and homogeneity were met. The analysis revealed a significant effect, $t\ (39) = 1.99$, $p = .05$. Examination of the mean showed that the percentage of improvement for the intervention group ($M = 1.43$, $SD = 2.15$) was greater than that of the control group ($M = 0.05$, $SD = 2.28$). Cohen's *D* was calculated to reveal the size of the effect for the difference between the two groups. The analysis showed an effect size of 0.62, suggesting a moderate performance effect. Additionally, a one-way ANCOVA was performed to test for differences between the two groups controlling for the distance of the event (because participants competed in different distances).

The statistical assumptions for normality and homogeneity were met. The analysis revealed again a significant effect for group, $F\ (1, 40) = 4.19$, $p < .05$, partial $\eta^2 = .10$, observed power = .51. The estimated mean for the percentage of improvement was 1.47 for the intervention group and 0.01 for the control group. Performance results are displayed in Figure 1.

DISCUSSION

Self-talk interventions have proven effective for enhancing sport task performance, however there is a lack of field experiments testing self-talk in real competitive environment. The present study provided evidence that self-talk strategies can facilitate sport performance in the complex environment of competition. Several issues warrant consideration and are addressed below. These issues pertain to the use of self-talk, the effectiveness of self-talk, and finally the limitations characterizing field experimental designs and future self-talk directions.

Use of Self-talk

In accordance to previous findings (Hatzigeorgiadis, Zourbanos, Mpoumpaki, & Theodorakis, 2009; Landin & Hebert, 1999) it was found that practicing self-talk leads to systematic

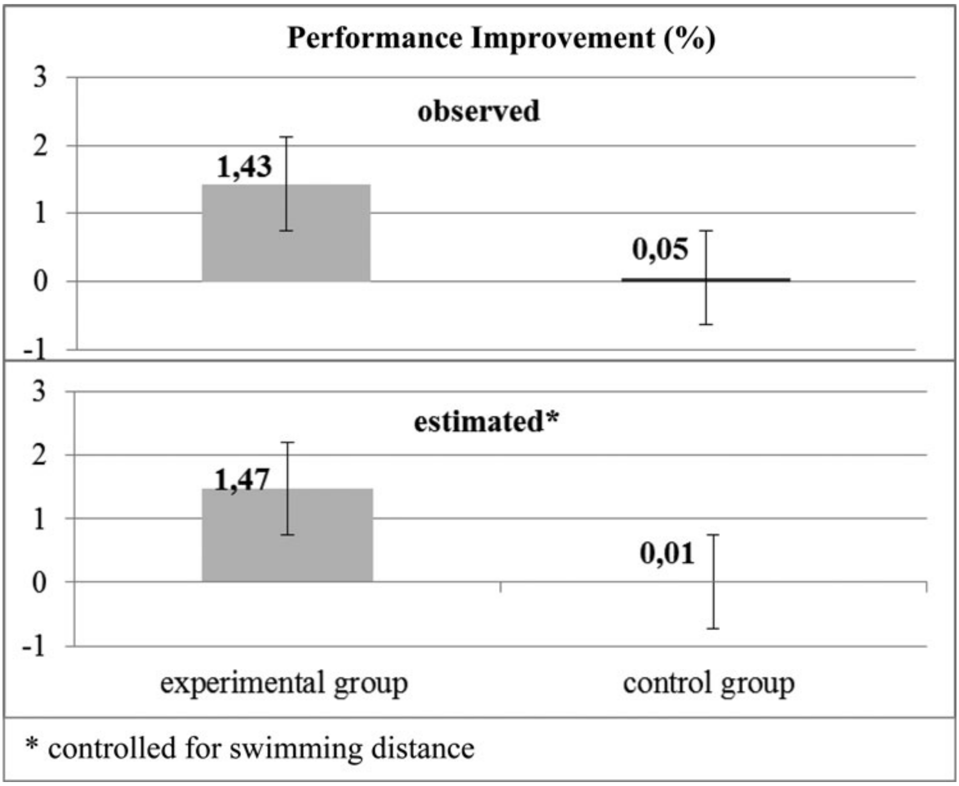

Figure 1. Performance improvements for the intervention and control groups.

use. Participants in the intervention group reported consistent use of self-talk during the training period; most importantly they reported adhering to their self-talk plan in competition. That swimmers adhered to their self-talk plan may have also been facilitated by their involvement in developing these plans. During the training period participants used a wide variety of instructional and motivational cues, and subsequently were allowed to design themselves a plan to use in competition. Hardy (2006) based on the premises of the self-determination theory (Deci & Ryan, 1985) suggested that the use of self-determined self-talk cues may have positive motivational influences. Latinjak, Torregrosa, and Renom (2010) further supported the effectiveness of self-determined forms of self-talk in a study with adult tennis players. The individualization process that was implemented in the present study may have increased participants' interest in the strategy, their commitment in using it, and maybe their belief for its effectiveness.

Another interesting finding that confirmed our expectations is the preference of swimmers for motivational self-talk in their competitive self-talk plans. The vast majority of swimmers included only motivational self-talk, and there was only one swimmer who chose not to include motivational self-talk in her competition plan. Participants practiced equally instructional and motivational self-talk during the training period but preferred motivational self-talk for the competition. Considering the competitive environment it was expected that athletes would seek to satisfy the need for psyching-up and building confidence, rather than providing instruction on how to perform skills, thus, building their self-talk plans based on motivational cues. Comparable field evidence has been reported in descriptive studies. Hardy, Hall, and Hardy (2005) reported athletes using self-talk in competition more than in training for motivational reasons, such as to get prepared. Similarly, Hardy, Hall, and Alexander (2001) found that athletes report more positive and motivating self-talk in the competitive context compared to training.

Research on skill-focused attention seems to support athletes' intuitive choice. Beilock, Carr, MacMahon, and Starkes (2002) argued that when practicing or attempting to correct a skill one's attention may be placed on the movement of the skill itself, and the use of explicit cues that direct attention to what they are doing help to produce or improve the quality of the desired movement. In this instance, movements are consciously controlled and effortfully produced, thus, the use of self-instruction can facilitate performance (e.g., Zourbanos, Hatzigeorgiadis, Bardas, & Theodorakis, 2013). In contrast, in competition athletes should move toward a more autonomous execution of performance, without conscious step-by-step monitoring of the skill. In such instances, self-regulatory strategies, which are not focused on the movement itself, such as self-affirmation to enhance effort and confidence, may enhance performance at higher levels of automatic skill execution (Kanfer & Ackerman, 1989). Thus, when competing, using a strategy, such as motivational self-talk, that prevents the likelihood of a performer focusing explicitly on task relevant information but may increase motivation and effort is more likely to be helpful.

Finally, with regard to the use of self-talk, some participants in the control group reported using some sort of self-talk, but in a non-systematic or pre-planned way. It is totally normal that people talk to themselves, especially athletes in achievement contexts; however it is the systematic use and maybe the knowledge of purpose that produce the desirable effects. Researchers should be careful in their manipulation checks with controls for differentiating between spontaneous and systematic self-talk. Most importantly, to make the difference between spontaneous and systematic self-talk clear, but also to improve the effectiveness of the intervention, designs including training self-talk should be sought, as it is the training that makes the difference in performance especially at competition level; Hatzigeorgiadis et al. (2011) reported training of self-talk as the strongest moderator of its effectiveness. Following the recommendation by Hardy, Hall, Gibbs, and Greenslade (2005) the use of self-talk was not assessed in the first competition to prevent the promotion of self-talk by swimmers of the control group thereafter; nevertheless none of the participants had ever received a psychological skills training intervention before.

Effectiveness of Self-talk

Studies supporting the effectiveness of self-talk in improving sport task performance (e.g., Perkos et al., 2002) but also sport performance (e.g., Mallett & Hanrahan, 1997) have provided valuable evidence and have increased our knowledge for the implementation of self-talk interventions. These studies encouraged us to attempt testing the effectiveness of self-talk in real competitive situations. The results of the present study confirmed the previous findings regarding the effectiveness of self-talk on sport performance in non-competitive settings through the experimentally induced timings. Furthermore, our results indicate that self-talk can be effective in the complex and often unpredictable competitive environment. The size of the improvement in statistical terms when comparing intervention and control groups (Cohen's $D = .62$) was moderate and close to the effect that was identified in the meta-analysis by Hatzigeorgiadis et al. (2011). Moreover, the size of the improvement in practical terms for the intervention group (1.46%) is considerable and one that can make a meaningful difference in competition.

Despite not having direct comparisons to test the effectiveness of the training process and the self-determined approach to the development of the individual self-talk plans, the results of the present study may help the development of the self-talk framework. First, the findings indicate that extended training may be important in maximizing the effectiveness of self-talk interventions, especially for athletes in competitive situations. Second, it can be postulated that involving athletes in the process of strategy development may further help enhancing the performance benefits, possibly through the motivational gains supported from the self-determination theory. In addition the findings provide indications for extending the matching hypothesis, suggesting that in the competitive context motivational self-talk may be more appropriate and therefore more effective than instructional self-talk.

Limitations

Field experiments involving psychological interventions in the complex competitive sport environment are characterized by limited experimental control, and that is one of the reasons that so few are carried out (Martin et al., 2005). Taking into account the purpose of the present investigation and considering in particular the focus on competitive performance such limitations could not be avoided. The lack of strict experimental control over performance conditions, as the competitive environment was different, but also the relative lack of control over training as swimmers were competing, and therefore training, for different events, may limit the internal validity of this experimental study. Nonetheless, it is these realistic conditions of the experimental design that also increase its external validity, as competition is at the core of the sport experience. Furthermore, the loss of participants has to be mentioned. This can be attributed to the length and the requirements of the intervention, but also to reasons beyond control such as the choice of events participants made for each of the two competitions.

Attempting to control for the limitations accompanying field experiments, thorough manipulation checks were performed. That no differences in importance of competition and pre-competition anxiety were identified for the two competitions within the total sample, but also between intervention and control group, at least indicates that participants were equally interested and committed to the competition before and after the intervention. Furthermore, the lack of differences in demographic and sport participation variables, which were not influenced by the loss of participants, supports the homogeneity of the sample.

That participants competed in different events presented a problem regarding the assessment of performance. To overcome this problem percentage of improvement between the two competitions, which takes into account the baseline performance, was calculated for the evaluation of performance. In addition, swimming distance was considered as a covariate to control for differences in swimming events. That the two analyses yielded similar results further enhance our confidence in the findings.

Another methodological issue that should be noticed concerns the way swimmers were assigned in to the different conditions. It was the swimming clubs that were randomly assigned as experimental and control, rather than the individual swimmers. A tradeoff decision had to be taken with regard to this issue. If participants from the same club were assigned to both experimental and control groups to protect the principle of the randomization, the experimental intervention would have been contaminated. Thus, to protect the integrity of the experimental condition we decided to have the different clubs randomly assigned to different groups.

Finally, the lack of a control treatment for the control group may raise concerns regarding the occurrence of a Hawthorne effect. Even though this possibility cannot be discarded, we

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believe that the likelihood of such motivational effect is scarce. The competitive context and importance of the competitive occasion which typically creates increased interest and motivation for achievement in athletes is unlikely to be seriously influenced by such indirect motivational factors.

The results of the present study encourage the implementation of field experiments to test the effectiveness of self-talk strategies. Future research should investigate the influence of self-talk interventions on complete sport performance, when the nature of the sport allows for such designs (e.g., athletics or archery), but also on performance features (e.g., serving in tennis or free throws in basketball) in sports where overall performance depends on multiple and complex factors, such as performance of the opponent (e.g., tennis and basketball respectively). The present study is innovative as it is to our knowledge the first to test experimentally the effectiveness of a self-talk intervention program on competitive sport performance. The findings are important because they support the value of self-talk strategies in the complex and often unpredictable competitive environment, thus, maximizing the ecological validity of the study. Furthermore, the findings provide direction for the development of future interventions, in particular with regard to the training of self-talk, the self-determined approach to the development of self-talk plans, and the use of motivational self-talk in the competitive context, and encourage the use and the practice of self-talk as a performance enhancing strategy in sport.

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APPENDIX
Example of a Personal Daily Training Self-talk Card

WEEK 5 – MOTIVATIONAL AND INSTRUCTIONAL SELF-TALK			
	What	**When**	**Why**
Motivational self-talk			
All styles	Let's go Strong Power legs Give it all	Just before the start of each repeat During the push after each turn	To boost effort
Instructional self-talk			
Freestyle	Elbow	On releasing the arm for recovery	To keep the elbow high
Backstroke	Deep	When entering the arm in the water	To take the arm deep enough for the catch
Breaststroke	Ankles	When completing the leg stroke	To continue the move until the ankles come together
Butterfly	Chin	Just before the exit of the head	To keep the chin close to the surface