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# Mechanisms underlying the self-talk–performance relationship: The effects of motivational self-talk on self-confidence and anxiety

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ABSTRACT

*Objectives:* The present study examined the effects of motivational self-talk on self-confidence, anxiety, and task performance in young athletes.

*Methods:* Participants were 72 tennis players. The experiment was conducted in five sessions: baseline assessment, three training sessions, and final assessment. After the baseline assessment participants were divided and assigned randomly into experimental and control groups. The two groups followed the same training program with the experimental group practicing the use of self-talk. In the last session, the final assessment took place. A forehand drive test was used to evaluate task performance, and the Competitive Anxiety Inventory-2R was used to assess self-confidence and anxiety.

*Results:* A two-way mixed model MANOVA revealed that task performance improved for the experimental group ($p < .01$) and remained stable for the control group; self-confidence increased ($p < .01$) and cognitive anxiety decreased ($p < .05$) for the experimental group, whereas no changes were observed for the control group. Correlation analysis revealed that changes in task performance were moderately related to changes in self-confidence ($p < .05$).

*Conclusions:* The results of the study showed that self-talk can enhance self-confidence and reduce cognitive anxiety. Furthermore, it is suggested that increases in self-confidence can be regarded as a viable function explaining the facilitating effects of self-talk on performance.



## Introduction

Self-talk has been central in cognitive behavioural modification (Meichenbaum, 1977). Based on the principle that what people say to themselves affects the way they behave (Ellis, 1976), strategies involving mental processes have been developed to regulate cognitions and develop or change existing thought patterns. The use of self-talk plans to control and organize athletes' thoughts has been promoted as a key component for successful sport performance, and self-talk is frequently included as an integral part of psychological skill training (Hardy, Jones, & Gould, 1996). Accordingly, sport research regarding the use and effectiveness of self-talk has received considerable attention in recent years. Research adopting various designs (e.g. experimental, intervention and single-subject designs) in a variety of sports and tasks has supported the effectiveness of the self-talk strategy in facilitating learning and improving task performance (Zinnser, Bunker, & Williams, 2006).

Research has progressively moved towards the identification of the functions underlying the effectiveness of self-talk, that is the mechanisms through which self-talk affects performance (Hardy, 2006). Johnson, Hrycaiko, Johnson, and Hallas (2004) suggested that the core of self-talk is that focusing on the desired thought leads to the desired behaviour. In other words, ST is an instruction to initiate or perform an action or a sequence of actions. Several explanations have been provided regarding the facilitating effects of self-talk on performance. Landin (1994) and Nideffer (1993) supported an attentional interpretation of the self-talk effects. Landin proposed that self-talk can be used to enhance attentional focus, whereas Nideffer indicated that self-talk can be an effective strategy for directing or redirecting attention to task relevant cues. Finn (1985) and Zinnser et al. (2006) suggested that self-talk can serve to regulate effort and enhance self-confidence, whereas Hardy et al. (1996) argued that self-talk can also be effective in controlling anxiety and triggering appropriate action.

Hardy, Gammage, and Hall (2001) in a qualitative descriptive inquiry, based on Paivio's (1985) conceptualisation regarding the functions of imagery, identified two broad functions of self-talk, cognitive and motivational. They suggested that these two general functions can be further broken down into more specific lower order functions. Accordingly, the motivational function comprises

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a motivational arousal function (referring to psyching-up, relaxation, and arousal control), a motivational mastery function (referring to mental toughness, confidence and mental preparation), and a motivational drive function (referring to regulating drive and effort). Similarly, the cognitive function comprises a cognitive specific function (referring to skill learning and development) and a cognitive general function (referring to strategy and performance enhancement). Considering Hardy et al.'s approach, Zervas, Stavrou, and Psychountaki (2007) developed an instrument assessing the two broad cognitive and motivational functions. The authors created a pool of items assessing the two dimensions (cognitive, e.g. I talk to myself to give directions; motivational, e.g. I talk to myself to increase motivation), and supported the factorial validity and the reliability of the instrument. On concluding, they identified that further developments should consider the role of self-talk in regulating specific psychological aspects of performance, such as self-confidence, mood, anxiety control and effort, as possible functions of self-talk. Finally, Theodorakis, Hatzigeorgiadis, and Chroni (2008) based on empirical evidence and raw data generated through athletes' reports further examined the functions of self-talk. Content analysis and a series of exploratory and confirmatory factor analyses identified five distinct functions of self-talk. In particular, they suggested that self-talk can serve to enhance attentional focus, increase self-confidence, regulate effort, control cognitive and emotional reactions, and trigger automatic execution, and provided evidence regarding the psychometric properties of the questionnaire.

Preliminary evidence regarding the speculated effects of self-talk has been provided through studies examining the effectiveness of self-talk in a variety of tasks and settings, and through athletes' post-experimental reports. Van Raalte, Brewer, Rivera, and Petipas (1994) asked young tennis players after the conclusion of competitive matches to report their self-talk and how they thought their self-talk affected their performance. Participants reported that positive self-talk helped them concentrate and enhanced their motivation. Landin and Hebert (1999) implemented a self-talk strategy aiming at improving volleying skills in collegiate tennis players. Participants reported that self-talk helped them feel more confident and direct their attention more efficiently. Perkos, Theodorakis, and Chroni (2002) administered a 12-week self-talk training program in young basketball players and found that the use of self-talk improved players' dribbling and passing performance. In a post-experimental short questionnaire participants indicated that the use of self-talk improved their concentration and self-confidence. Thelwell and Greenlees (2003) implemented a psychological skills training program to four recreational athletes competing at a laboratory-based triathlon task. The results revealed that participants' performance at the task improved across trials. Participants perceived that self-talk increased their motivation and self-confidence and enhanced their attentional focus. Finally, Johnson et al. (2004) using a single-subject multiple baseline design, tested the effectiveness of a self-talk intervention program in female football players, assessing performance in the low drive shot over a period of three months. Their results showed that shooting performance improved for two of the three participants, whereas all three participants reported increased self-confidence compared to baseline.

An experiment investigating the attentional function of self-talk was conducted by Hatzigeorgiadis, Theodorakis, and Zourbanos (2004). They assessed performance and occurrence of interfering thoughts during performance in two experimental water-polo tasks. Their results revealed that task performance improved and interfering thoughts were reduced for participants using self-talk, whereas no differences were recorded for a control group. The authors also reported that increases in task performance were related to decreases in interfering thoughts, and suggested that performance enhancement could be attributed to the reduction of interfering thoughts, even though clear inferences regarding the causality could not be claimed.

Another line of research providing indirect evidence that self-talk may serve several functions involves the investigation of the effects different types of self-talk have on performance. Research on the effectiveness of self-talk has examined and compared the effects of different types of self-talk in experimental tasks. Theodorakis,Weinberg, Natsis, Douma, and Kazakas (2000) speculated that instructional self-talk should be more beneficial for fine tasks (tasks placing greater demands on accuracy and precision), whereas motivational self-talk should be more beneficial for gross tasks (tasks placing greater emphasis on strength and endurance). Subsequently they examined the effectiveness of motivational and instructional self-talk in four experimental tasks, which were characterised as fine (passing accuracy in football and serving accuracy in badminton) or gross (3-min sit-up test and knee extension power test). The results revealed that instructional self-talk improved the performance for the two accuracy tasks and the knee extension task, whereas motivational self-talk improved performance for the knee extension task only. In a similar experiment, Hatzigeorgiadis et al. (2004) tested the effectiveness of self-talk in a precision and a power water-polo task. Instructional self-talk improved performance for the precision task more than motivational self-talk, whereas only motivational self-talk improved performance for the power task. In general, even though the evidence is not conclusive, these findings suggest that different types of self-talk may have different effects on task performance based on the nature of the task and the type of self-talk that is used.

Stemming from such findings, Hatzigeorgiadis, Zourbanos, and Theodorakis (2007) suggested that if different self-talk cues have different performance effects, different types of self-talk should serve different functions. Zinsser et al. (2006) claimed that instructional self-talk should be effective in enhancing attentional focus and directing attention, whereas motivational self-talk should be more effective in enhancing motivation, building self-confidence and regulating effort. Two studies have examined whether different types of self-talk serve different functions. Hatzigeorgiadis (2006) examined participants' perceptions regarding the use of instructional and motivational self-talk after implementing a three-day self-talk training program in a swimming task. According to participants' perceptions both types of self-talk mainly helped them to improve their attention to the task. Furthermore, participants reported that the motivational self-talk cue had greater impact on effort than the instructional self-talk cue. In a similar experiment, Hatzigeorgiadis et al. (2007), in addition to participants' perceptions regarding the facilitative effects of self-talk, examined self-confidence, anxiety symptoms and frequency of interfering thoughts in the baseline (no self-talk) and experimental trials (instructional and motivational self-talk). The results revealed that the motivational self-talk cue was more effective in reducing anxiety than the instructional self-talk cue. Furthermore, participants reported that the use of both cues mainly helped them concentrate better on the task. The authors concluded that the effectiveness of self-talk can be attributed mainly to its attention function, at least in the case of novel tasks, but also that motivational self-talk is more effective in reducing anxiety than instructional self-talk. Subsequently they suggested that self-talk content moderates self-talk functions, that is, different types of self-talk may serve different functions depending on the content of the self-talk cues. Nevertheless, it should be noted that in the above experiments (a) students were recruited and not athletes, and (b) within subjects differences were examined in the use of different self-talk types, without the use of control groups.

The purpose of the present study was to examine whether the use of motivational self-talk can increase self-confidence, reduce anxiety and enhance task performance in athletes. The beneficial

effects of self-talk on task performance are well documented in the literature (Zinsser et al., 2006). Furthermore, preliminary evidence suggests that self-talk may serve to increase self-confidence in athletes (Johnson et al., 2004; Landin & Hebert, 1999; Perkos et al., 2002). Sport anxiety theory and research has provided evidence regarding the relationship between self-confidence and anxiety, in particular cognitive. Martens, Burton, Vealey, Bump, and Smith (1990) supported the negative relationship between cognitive anxiety and self-confidence and characterised self-confidence as the relative absence of cognitive anxiety. Even though the interdependence of the two constructs has been criticised on the evidence of different relationships between the two and third variables (Woodman & Hardy, 2003), a moderate negative relationship between the two has been consistently supported in the literature. This led us expect that the hypothesised facilitative effects of self-talk on self-confidence will apply for anxiety as well, at least for cognitive. Further evidence that cognitive strategies can reduce competitive anxiety has been provided by Maynard, Smith, and Warwick-Evans (1995) and Maynard, Hemmings, Greenlees, Warwick-Evans, and Stanton (1998). In these studies, cognitive intervention programs involving positive thought control were implemented. The results showed that the interventions were effective in reducing competitive anxiety, in particular cognitive.

It has been suggested that motivational self-talk can have greater impact on motivational-related outcomes, such as effort, self-confidence, and anxiety (Zinsser et al., 2006), and preliminary evidence seems to support this hypothesis (Hatzigeorgiadis et al., 2007). As the primary purpose was to examine the effects of self-talk on self-confidence and anxiety, the use of motivational self-talk was preferred. Based on the preliminary evidence and the above assumptions, it was hypothesised that the use of motivational self-talk (a) will enhance performance, (b) will increase self-confidence and reduce cognitive anxiety, whereas no predictions were made regarding somatic anxiety.

## Method

### *Participants*

Participants were 72 (36 males and 36 females) competitive young tennis players (mean age 13.47 ± 1.78). They were recruited from three tennis clubs situated in the midlands of Greece. Participants had been training systematically for 4.10 (±2.32) years and had been competing for 2.05 (±1.95) years. All players had regional age-group rankings and their competitive experience involved regional and national competitions at junior level. All participants completed the experimental procedures.

### *Task and instruments*

#### *Performance*

Forehand drive performance was evaluated through the Broer–Miller Forehand Drive test (as described by Barrow, McGee, & Tritschler, 1989). Participants were standing at the baseline of the court. The opposite half of the court was divided into zones corresponding to a scoring-system (two, four, six, and eight points), with balls landing close to the baseline counting for eight points and balls landing close to the net counting for two points. Following the description of the test, a rope was placed over the net, at a height of 1.22 m. Participants were hitting balls coming from a ball machine (Lobster Elite Freedom). The score of participants was the total points gained out of 10 strokes. Balls travelling over the rope were scored half their original value.

#### *Self-confidence and anxiety*

The Competitive State Anxiety Inventory-2 revised (CSAI-2R; Cox, Martens, & Russell, 2003) was used to assess self-confidence and anxiety. The scale comprises 17 items assessing cognitive anxiety (five items), somatic anxiety (seven items) and self-confidence (five items). Responses were given on a four-point Likert scale from 0 (not at all) to 3 (very much so). Cronbach's alpha in this study ranged from .74 to .90.

### *Procedures*

Participation was voluntary and athletes were informed that they could withdraw at anytime if they wanted to. All participants agreed to participate and parental consent was obtained for all athletes. The research ethics committee of the researchers' institution granted ethical approval for the conduct of the study. The experiment was completed in five sessions: baseline trial (session 1), training (sessions 2–4), and experimental trial (session 5).

#### *Session 1*

Participants were initially informed that for the following five sessions they were going to participate in a program aiming to assess their tennis abilities. The aim was to raise participants' anxiety to levels comparable to a sport competition, so that the hypothesised impact of self-talk could be detected. Towards this direction, Murray and Janelle's (2003) recommendations were adopted. In particular, participants were informed that the whole procedure was going to be recorded, that the results were to be made public to the club, that performance of individuals was going to be compared, and that awards (tennis goods) would be given to the top three players. Subsequently, the procedures regarding the evaluation were explained, and participants were allowed to ask questions with regard to these procedures. Finally, the stressful instructions were repeated and before the beginning of the first trial participants completed a one-item manipulation check regarding the stressfulness of the situation (from 1 not at all stressful, to 10 very stressful). Participants performed three sets of 10 drives. The first set was used for purposes of familiarization (not assessed), whereas the two following sets were assessed. Upon completion of the third set participants completed the CSAI-2R (the instruction was to indicate how they felt during the execution of the task).

#### *Sessions 2–4*

Upon completion of the baseline trial, participants were divided into two groups that were randomly assigned as experimental and control. Participants were placed in the groups so that no baseline differences would emerge between the two groups in the variables of interest (performance, self-confidence, and anxiety). The two groups followed similar training protocols for the next three training sessions. In addition, all participants received additional training as part of their participation to the program. For the training phase, the backhand drive was used, so that participants did not practice the stroke that was to be evaluated in the final assessment. The use of the backhand drive aimed to minimize possible performance increases due to practicing the stroke, and to isolate to the highest possible degree the effects of self-talk on task performance. Participants in the experimental group were introduced to the use of self-talk and were informed that they were going to use this strategy for their training. The instructor explained and showed them how to use self-talk. To prevent the appearance of a Hawthorne effect, participants in the control group spent the same time receiving a short lecture on tactical aspects of the shot. All participants performed four sets of eight drives, with a 1 min interval in-between. Participants in the experimental group used one self-talk cue for each set. These cue words were provided by the instructor and were both instructional (e.g. shoulder, low, deep) and motivational (e.g. go, I can, strong). The rational for using instructional and motivational cues for the training phase was to have participants practicing, understanding and learning how to

use the self-talk technique thoroughly, and not just to practice self-talk cues to use in the experimental measure. Participants were instructed that they could repeat the cue aloud or in their head without verbalising it, according to their preference. After the completion of each set, participants were asked to indicate on a 10-point scale how frequently they use the instructed cues (1 = not at all, 10 = all the time). For the training sessions, balls were thrown by the coach (not the ball machine) to allow participants to concentrate better on the practice of self-talk (adjust the timing and get acquainted with the use of self-talk without the time pressure put by the ball machine), which was a new strategy. The same procedures were followed for the two sessions that followed. The training took place in groups of four or five athletes. To prevent contact between participants from different groups, the two groups were scheduled to train different hours of the day.

*Session 5*

In the fifth session, the test of the first session was repeated. Participants were reminded of the stressful instructions. With regard to the awards, to keep all participants involvement high irrespective of their scores in the initial assessment, it was announced that the awards would be given to athletes showing greater improvement compared to the initial test. Despite that there would be less room for improvement for participants with higher scores, this maneuver would help participants with lower scores to sustain interest in the assessment. In addition, to maintain stress levels, an individual was introduced to the participants as a member of the tennis federation who had come to watch their test. Subsequently, the one-item manipulation check regarding the stressfulness of the situation was administered. As in the baseline assessment, all participants performed three sets of 10 drives, with the first set used for familiarization. Participants in the experimental group were asked to choose and state a motivational cue of their preference that they would use. Upon completion of the two sets participants completed the CSAI-2R. Following this, a manipulation check protocol was administered. Participants in the experimental group were asked (a) to indicate on a 10-point scale the degree to which they used the cue they selected (1 = not at all, 10 = all the time), (b) to report whether they used any other cue, (c) if so, what this cue was, and (d) if so, the degree to which they used this other cue (1 = not at all, 10 = all the time). Participants in the control group were informed that athletes frequently say things to themselves while performing and were asked to indicate (a) whether they purposely used with consistency any form of self-talk during the execution of the task, (b) if so, what was that, and (c) if so, to what degree (1 = not at all, 10 = all the time).

After the conclusion of the experimental procedures participants were explained the purpose of the study. In addition, they were debriefed in relation to the stressful instructions and in the presence of the so-called member of the federation, and were thanked for their participation.

## Results

*Manipulation check*

*Stress condition*

The first manipulation check involved participants' perceptions regarding the stressfulness of the situation. Examination of the mean scores revealed that participants perceived the situation as moderately stressful in both the initial and the final assessments (mean scores $5.32 \pm 1.87$ and $5.26 \pm 2.19$, respectively).

*Self-talk in training – Experimental group*

The second manipulation check involved the use of self-talk during the training sessions by participants in the experimental group. Examination of the mean scores revealed that athletes made adequate use of self-talk during the three training sessions ($7.78 \pm 1.19$, $7.74 \pm 1.10$, and $7.96 \pm 1.07$ for the three sessions, respectively).

*Self-talk in final trial – Experimental and control groups*

The final manipulation check involved the use of self-talk during the final trial by participants in the experimental and control groups. Regarding the experimental group it was revealed that two of the participants reported not using the selected cue consistently (scored 2 out of 10). Regarding the control group it was revealed that six participants reported consistent use of some form of self-talk. In particular, two of the athletes reported using the cue "let's go", one athlete reported using the cue "strong", one athlete reported using the cue "I can", one athlete reported using the cue "focus", and finally one athlete reported using the cue "baseline". To ensure the integrity of the experimental manipulations the two athletes from the experimental group and the six athletes from the control group were excluded from subsequent analyses. After removing these participants examination of the means showed that participants in the experimental group reported consistently using the cue they selected ($7.79 \pm 1.55$) and no other self-talk ($1.26 \pm 1.58$), whereas participants in the control group reported not using consistently any form of self-talk ($1.67 \pm 1.63$).

*Baseline differences*

Baseline differences were subsequently examined to ensure that there were no significant differences between the two groups in performance, self-confidence, cognitive anxiety and somatic anxiety. This test was performed to secure the meaningfulness of the repeated measures that would follow. Furthermore, because boys and girls were distributed to the two groups, gender was also considered. A two-way MANOVA revealed no significant effect for group, $F(4, 57) = .14$, $p = .97$, gender, $F(4, 57) = .89$, $p = .47$, and their interaction, $F(4, 57) = .57$, $p = .69$.

*Main analysis – Repeated measures MANOVA*

Descriptive statistics for performance, self-confidence, cognitive and somatic anxiety, for the total sample are presented in Table 1. A two-way (group by trial) mixed model MANOVA was calculated to test for differences in performance, self-confidence, cognitive and somatic anxiety over trials between the two groups. The assumptions of normality and homogeneity of variance and covariance were met. The analysis revealed a significant multivariate group by trial interaction, with large effects size, $F(4, 59) = 7.08$, $p < .001$, $\eta^2 = .32$, observed power = .99. Examination of the univariate effects showed significant interaction effects for performance, $F(1, 62) = 19.46$, $p < .001$, $\eta^2 = .24$, observed power = .99, self-confidence, $F(1, 62) = 5.06$, $p = .028$, $\eta^2 = .08$, observed power = .60, and cognitive anxiety, $F(1, 62) = 4.96$, $p = .030$, $\eta^2 = .07$, observed power = .59, and a non-significant interaction for somatic anxiety, $F(1, 62) = 1.77$, $p = .19$. Examination of the pairwise comparisons and the means revealed that for the experimental group task

**Table 1**
Descriptive statistics for the total sample

| | Initial assessment | | Final assessment | |
|---|---|---|---|---|
| | *M* | SD | *M* | SD |
| Performance | 37.26 | 12.65 | 40.35 | 13.44 |
| Self-confidence | 1.59 | .72 | 1.74 | .71 |
| Cognitive anxiety | 1.20 | .69 | 1.12 | .76 |
| Somatic anxiety | .86 | .57 | .75 | .63 |

performance improved ($p < .001$), self-confidence increased ($p = .002$) and cognitive anxiety decreased ($p = .031$), whereas a decrease that approached significance was revealed for somatic anxiety ($p = .062$). In contrast, no significant differences were revealed for any of the variables for the control group. The interaction pattern and the mean scores for the two groups are displayed in Fig. 1 (performance), Fig. 2 (self-confidence), Fig. 3 (cognitive anxiety), and Fig. 4 (somatic anxiety).

*Correlations*

Finally, the degree to which changes in task performance were related to changes in self-confidence and anxiety were examined through Pearson's correlations. For the purposes of this particular analysis scores reflecting the changes between baseline and experimental assessments were calculated by subtracting scores in the baseline assessment from scores in the experimental assessment (positive scores indicating increases). The analysis, which involved the whole sample, revealed a positive moderate relationship between changes in task performance and changes in self-confidence ($r = .29$, $p = .020$), whereas no relationships were identified between changes in task performance and changes in cognitive anxiety ($r = -.01$, $p = .996$) and between changes in task performance and changes in somatic anxiety ($r = -.06$, $p = .668$).

## Discussion

The primary purpose of the present study was to explore the effects of motivational self-talk on self-confidence, anxiety, and task performance. Furthermore, the degree to which changes in task performance were related to changes in self-confidence and anxiety was tested. Overall, it was found that self-talk had a positive effect on task performance, increased self-confidence, reduced cognitive anxiety, and that changes in task performance were related to changes in self-confidence.

Before proceeding to the hypotheses testing, the experimental conditions that were sought were evaluated. The first objective was to create an environment that would reasonably raise stressful perceptions, so that effects of self-talk on anxiety and self-confidence could be examined. The recommendation of Murray and Janelle (2003) for creating stressful conditions were adopted, which have proved effective in previous research (e.g. Murray & Janelle, 2007; Wilson, Smith, Chattington, Ford, & Marple-Horvat, 2006). The results showed that participants perceived the situation as moderately stressful. Moreover, examination of the anxiety scores, in particular cognitive, for the baseline assessment showed moderate levels of anxiety intensity, which resemble anxiety levels reported in field studies with young athletes (e.g. Hall & Kerr, 1997). Considering that participants were athletes with experiences of competitive stress, the moderate levels of stress that were induced were deemed satisfactory.

The second objective was to familiarise participants in the experimental group with the use of self-talk. Results regarding the use of self-talk in the training session and the final assessment showed that participants made adequate use of the self-talk strategy. Finally, to ensure the integrity of the experimental conditions with regard to the use of self-talk, participants' reports in the final assessment were examined. Six participants from the control group reported systematic use of cues that could be described as instructional or motivational self-talk. Furthermore, two participants from the experimental group reported not using the cue they selected. With regard to the control group there is little that can be done and that mainly relates to employing participants with no previous experience in the use of mental strategies and keeping participants unaware of the experimental conditions. To

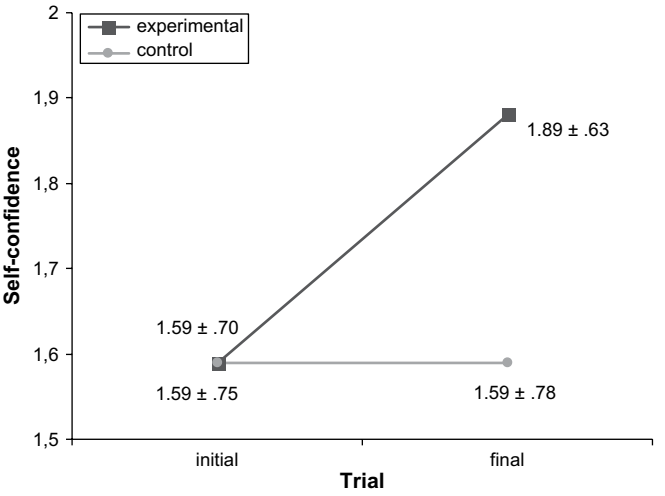


**Fig. 2.** Self-confidence scores in the initial and final trials for the experimental and control groups.

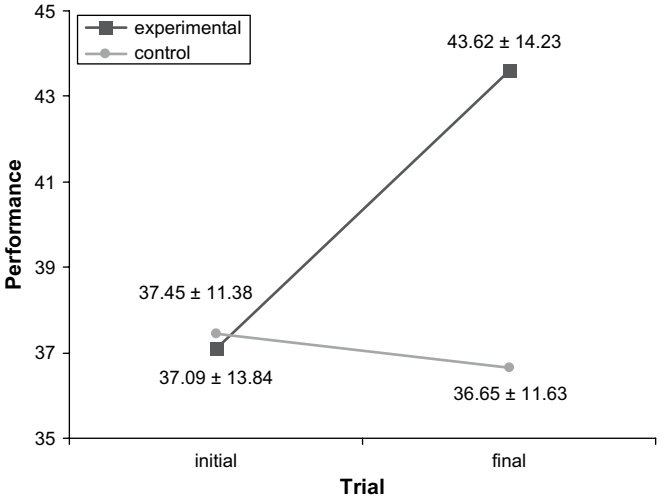


**Fig. 1.** Performance scores in the initial and final trials for the experimental and control groups.

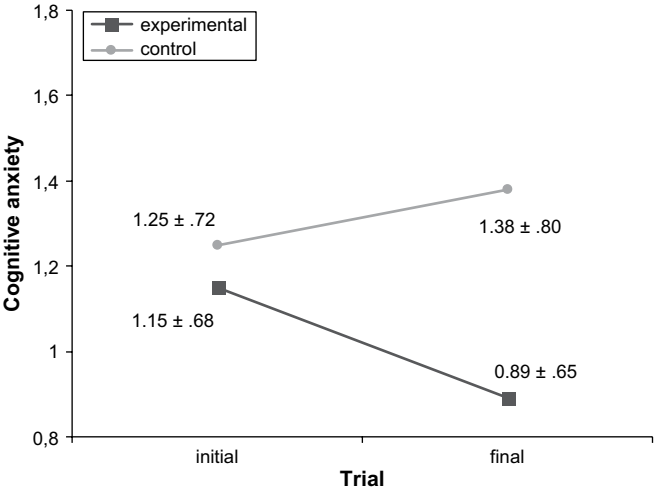


**Fig. 3.** Cognitive anxiety scores in the initial and final trials for the experimental and control groups.

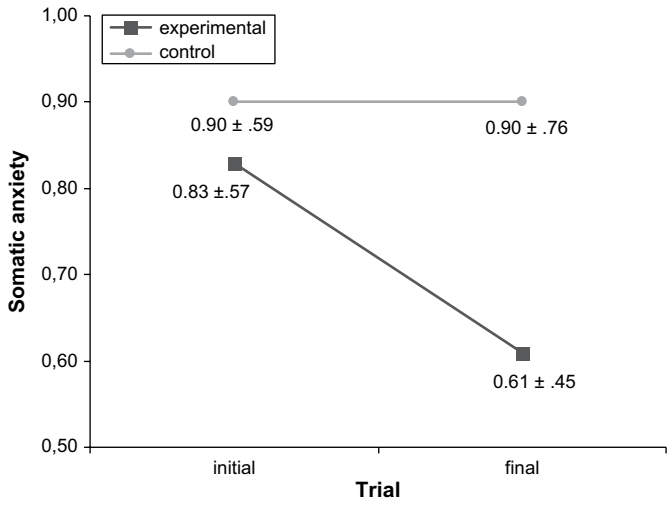


**Fig. 4.** Somatic anxiety scores in the initial and final trials for the experimental and control groups.

prevent the promotion of self-talk, participants' self-talk during the baseline assessment was not assessed. Furthermore, participants in the two groups trained and completed the final assessment separately. The vast majority of participants in the experimental group made adequate use of the self-talk strategy which suggests that short training may have been beneficial for the consistent use of the technique. Furthermore, allowing participants to choose among appropriate cues may have also facilitated the use of self-talk.

In accordance with previous findings, the use of self-talk improved task performance. Research has generally supported the beneficial effects of self-talk on learning and task performance in various settings (novice athletes, Perkos et al., 2002; highly skilled athletes, Landin & Hebert, 1999; learned skills, Harvey, Van Raalte, & Brewer, 2002; new skills, Hatzigeorgiadis et al., 2004), and sports (ski, Rushall, Hall, Roux, Sasseville, & Rushall, 1988; sprints, Mallet & Hanrahan, 1997; tennis, Landin & Hebert, 1999; basketball, Theodorakis, Chroni, Laparidis, Bebetsos, & Douma, 2001). The results of the present study confirm that self-talk is an effective strategy for enhancing task performance. Although motivational self-talk has been primarily recommended for gross tasks requiring strength and endurance (Theodorakis et al., 2000), the present results suggest that it can also be effective for tasks requiring precision, a finding previously reported by Hatzigeorgiadis et al. (2004). They suggested that different types of self-talk may have different effects on task performance based on the nature of the task and the type of self-talk that is used. That self-talk also improved self-confidence may explain why task performance in this precision task improved. This possibility is further discussed below.

Post-experimental reports from studies examining the effectiveness of self-talk have given indications that self-talk may increase self-confidence. Landin and Hebert (1999), in a study with skilled female tennis players, used a single-item measure to assess their self-confidence in accomplishing a task, before and after the implementation of a self-talk treatment program. The study involved five players, thus statistical analyses were not conducted; however, an increase in players' self-confidence was recorded. In a study following the same research design with female football players, Johnson et al. (2004) reported similar findings. Finally, Perkos et al. (2002) in a study with young basketball players used a single-item measure to assess perceived effectiveness of self-talk in relation to athletes' self-confidence, after implementing a 12-week intervention program. Participants reported that the use of self-talk helped them feel more confident. Nevertheless, so far this hypothesis had not been tested experimentally. The present study examined changes in self-confidence after the implementation of a self-talk training program. The results showed that self-confidence of participants using motivational self-talk increased, whereas that of control participants remained unchanged, thus providing empirical evidence for the effects of motivational self-talk on self-confidence.

The effectiveness of cognitive strategies in reducing anxiety in athletes has been supported by Maynard et al. (1995, 1998) in two intervention studies where positive thought control training was used. With specific regard to the impact of self-talk on anxiety, preliminary evidence has been provided by Hatzigeorgiadis, Zourbanos, and Theodorakis (2007) in a novel experimental motor task with students. Their findings showed that the use of self-talk resulted in reductions of cognitive anxiety. Furthermore, comparing the effects of an instructional and an anxiety control cue on anxiety symptoms showed that the anxiety related cue resulted in greater reduction of cognitive anxiety than the instructional cue. The authors supported the specificity of self-talk effects in relation to the selected cues. Nevertheless, no control group was employed in that study. The above evidence and the theoretical links between self-confidence and anxiety along with the respective empirical evidence (Martens et al., 1990), led us to hypothesise that if self-talk increases self-confidence, then anxiety should be reduced. The results of the study supported this hypothesis, in particular for cognitive anxiety, as intensity of symptoms was reduced for the experimental group but not for the control group. Regarding somatic anxiety the same pattern was revealed; however the reduction was not significant.

Further analyses were conducted to test the relationship between changes in task performance and changes in self-confidence and anxiety. The results revealed that changes in self-confidence were moderately positively related to changes in task performance. In contrast, no relationships were found between changes in cognitive and somatic anxiety and changes in task performance. Research on the relationship between self-confidence and performance has provided consistent results indicating that self-confidence and performance are positively related, and this relationship is moderate in size. A meta-analysis by Craft, Magyar, Becker, and Feltz (2003) showed an effect of .36, and a similar meta-analysis by Woodman and Hardy (2003) revealed an effect of .24. In contrast, examination of the relationship between anxiety and performance has provided equivocal results, suggesting that cognitive and somatic anxiety can have either positive, negative or no relationships with sport performance. Characteristic of this inconsistency are the results of the two aforementioned meta-analyses. Craft et al. (2003) reported an effect of .13 between cognitive anxiety and performance and an effect of .09 between somatic anxiety and performance, whereas Woodman and Hardy (2003) reported an effect of −.10 for the relationship between cognitive anxiety and performance (the effect between somatic anxiety and performance was not tested in that study). The results of the present study are in line with the findings regarding the self-confidence – performance relationship. Given that the use of motivational self-talk enhanced task performance and increased self-confidence and considering that increases in self-confidence were related to increase in task performance, it could be speculated that increases in self-confidence may be a viable mechanism explaining the facilitating effects of self-talk on task performance. Even though self-talk reduced anxiety, in particular cognitive, these changes were not related to changes in task performance.

Limitations of the study should be addressed, in particular with regard to the mediating role of self-confidence in the self-talk – task performance relationship that was discussed. Measures of anxiety and self-confidence were obtained after the conclusion of the task, therefore it is possible that participants' responses could have been influenced by their performance. Furthermore, the analyses that were performed were independent for self-confidence, anxiety,

and task performance. Self-confidence and performance have a reciprocal relationship, so it is possible that either increases in self-confidence due to self-talk raised task performance, or increases in task performance due to self-talk raised self-confidence (or even both in a reciprocal manner). The timing of anxiety and self-confidence measures is a common problem in sport anxiety research. Measures administered before or after an event can shed limited light into what happens during task performance. Still, the fact that participants were not aware of their exact performance and whether they were improving or not, seems to strengthen the possibility of the self-confidence mediation. Overall, the results did show that motivational self-talk increased self-confidence and reduced cognitive anxiety, so the mediation hypothesis is a viable explanation regarding the facilitating effects of self-talk on task performance. Nonetheless, the present findings cannot support the mediation, but rather suggest that self-confidence is a likely mechanism through which self-talk facilitates task performance, and challenge further research with appropriate designs to support the mediational role of self-confidence. To further explore the mediation hypothesis future research could employ laboratory tasks where anxiety can be assessed at the time of the performance using a combination of physiological and psychological measures. Furthermore, because self-talk is said to operate through several functions, future research should test simultaneously multiple functions and identify how these may interact in raising task performance.

Despite the above issues, the present study offers valuable evidence regarding the role of self-talk. The results provided further support regarding the effectiveness of self-talk on task performance. Hatzigeorgiadis et al. (2004) postulated an attentional interpretation of the facilitating effects of self-talk on task performance and suggested that further research should look for other likely functions of self-talk. The present findings suggest two more possible functions through which motivational self-talk may operate, increases in self-confidence and reduction in anxiety intensity symptoms. That the effects of self-talk on anxiety were not related to task performance seems to indicate that self-talk can be used to reduce anxiety, however, whether this reduction will relate to increases in task performance is probably moderated by other factors. Understanding the functions through which self-talk operates will facilitate the development of effective self-talk plans and towards this direction the present study provided valuable evidence.

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