# Self-talk and Softball Performance: The Role of Self-talk Nature, Motor Task Characteristics, and Self-efficacy in Novice Softball Players

By: Yu-Kai Chang, Li-An Ho, Frank Jing-Horng Lu, Ching-Chieh Ou, Tai-Feng Song, Diane L. Gill

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## Abstract:

*Objectives:* To determine the effect of self-talk on softball throwing performance. Additionally, two moderators, nature of self-talk and type of motor task, as well as a potential mediator of self-efficacy were examined.

*Design:* An experimental, within-subjects, and counterbalanced design.

*Methods:* Forty-two senior high students (mean age = 17.48 $\pm$ 0.55) were instructed to use instructional, motivational, and unrelated self-talk with counterbalanced order prior to softball throwing for accuracy and distance tasks.

*Results:* Both instructional and motivational self-talk conditions had better performance than unrelated self-talk on softball throwing accuracy, whereas motivational self-talk had better performance than both instructional and unrelated self-talk in softball throwing for distance. Results for self-efficacy were similar, with self-efficacy for accuracy performance higher in both instructional and motivational self-talk conditions than with unrelated self-talk, while self-efficacy was highest in the motivational self-talk condition and lowest with unrelated self-talk. Significant correlations between self-efficacy and motor performance were also found with both tasks.

*Conclusion:* These findings partially support the task-matching hypothesis, confirm the moderator role of type of self-talk and task type, suggest that self-efficacy has a mediator role, and provide direction for self-talk effectiveness.

**Keywords:** Instructional self-talk | Motivational self-talk | Psychological skill | Softball throwing

**Article:**

Self-talk is a cognitive strategy and essential psychological skill for enchaining performance. While a few scholars argue that the effect of self-talk on competitive sport is limited (Boroujeni and Shahbazi, 2011 and Goudas et al., 2006), considerable empirical research has demonstrated that self-talk facilitates varied sport and motor performances (Edwards et al., 2008, Kolovelonis et al., 2011 and Weinberg et al., 2012). The benefits of self-talk have been further supported by both narrative and systematic reviews (Hardy, 2006 and Tod et al., 2011). In fact, a recent meta-analytic review concluded that self-talk had a significant and positive effect with moderate magnitude on performance (effect size, ES = 0.48) (Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011).

It should be noted, however, that the effect sizes of the meta-analysis had a wide range (ES ranged from 0.22 to 1.31), suggesting that some unexamined factors influence self-talk and performance. Hardy (2006)indicated that self-talk is difficulty to define as a single construct, and suggested that self-talk be considered as a) statements to the self, b) multidimensional, c) having interpretive elements associated with the statements, d) dynamic, and e) serve at least instructive and motivational functions. These multiple characteristics provide guides for further investigation of the relationship between self-talk and performance. Indeed, Tod et al. (2011) argued that researchers should shift their focus from “first-generation questions”, that is, examination of self-talk effects on performance, to “second-generation questions”, that is, investigation of moderators and mediators underlying the relationship. Herein, the present study emphasizes two moderators, nature of self-talk and type of motor task, as well as a mediator, self-efficacy, to add to the current knowledge base.

Other than early studies examining the differences between positive and negative self-talk (Dagrou et al., 1992 and Van Raalte et al., 1995), research on the nature of self-talk has emphasized the investigation of instructional and motivational self-talk (Beneka et al., 2013, Boroujeni and Shahbazi, 2011, Edwards et al., 2008, Hatzigeorgiadis et al., 2004, Kolovelonis et al., 2011 and Tod et al., 2009). Instructional self-talk focuses on technical, tactical, or kinesthetic demands of performance, whereas motivational self-talk is associated with controlling arousal, preparing for mastery, and increasing effort devoted to the task (Hardy, 2006, Hardy et al., 2001 and Hatzigeorgiadis et al., 2004). Given the differences between instructional and motivational self-talk, it is possible that the impact on performance depends on nature of self-talk as well as the task.

From a series of laboratory experiments, Theodorakis, Weinberg, Natsis, Douma, and Kazakas (2000) found that an instructional self-task group, compared to motivational self-talk and control groups, demonstrated better performance on tasks requiring fine motor skills (e.g., soccer accuracy pass). In contrast, both instructional and motivational self-talk led to improvement on tasks that involved gross motor characteristics (e.g., muscular strength) compared to a control group. Similar results were found with a novice skill in swimming (Hatzigeorgiadis et al., 2004); although both self-talk types showed better performances on an accuracy task (i.e., throwing a ball toward to target) compared to control group, instructional self-talk group had the greatest impact. Conversely, improved performance on a power task (throwing a ball for distance) was only found in the motivational self-talk group. These studies lead to the "task-matching hypothesis", which suggests that instructional and motivational self-talk are associated with specific tasks requiring fine- and gross-skills, respectively (Hardy et al., 2009 and Hatzigeorgiadis et al., 2011).

Notably, research on the matching hypothesis has produced equivocal results. For example, Harvey, Van Raalte, and Brewer (2002) indicated that individuals in an instructional self-talk group failed to demonstrate differences compared to a control group on golf pitching accuracy. In addition, while improvements from pre- to post-test were identified, no differences were found among instructional, motivational, and combined self-talk groups on a one-mile run test (Weinberg et al., 2012). In contrast, Kolovelonis et al. (2011) indicated both instructional and motivational self-talk improved chest-pass (fine-motor) performance, with no difference between groups. Similar results of enhanced performance with no differences between the two conditions were also observed in a gross-motor task including center-of-mass displacement, impulse, and angler rotation of vertical jump height (Tod et al., 2009). Although one meta-analytic review supported the matching hypothesis (Hatzigeorgiadis et al., 2011), another recent systematic review reported lack of support for the matching hypothesis, concluding that both types of self-talk facilitate performance regardless of task characteristics (Tod et al., 2011). These inconsistent conclusions, and the fact that only a few studies involved in systematic and meta-analytic reviews have adequately tested the task-matching hypothesis with appropriate self-talk nature and task types simultaneously (Hatzigeorgiadis et al., 2011 and Tod et al., 2011), suggest the need for further research. Therefore, the current study examines the role of self-talk nature and task characteristics in the relationship between self-talk and motor performance fully taking into account these factors.

Previous studies examined self-talk and performance with athletes including cross-country runners (Weinberg et al., 2012), soccer players (Johnson, Hrycaiko, Johnson, & Halas, 2004), rugby union athletes (Edwards et al., 2008), volleyball players (Zetou, Vernadakis, Bebetsos, & Makrari, 2012) and athletes in diverse sports (Hardy, Craig, & Hardy, 2004); however, only a few studies have examined the benefits of self-talk – with the general population, such as preadolescent students (Kolovelonis et al., 2011 and Kolovelonis et al., 2012) and undergraduate students (Oliver, Markland, & Hardy, 2010). Specifically, Kolovelonis and colleagues indicated that self-talk, of either type or combined with other psychological skills (i.e., goal setting), can be an effective cognitive strategy to enhance performance among students in physical education settings (Kolovelonis et al., 2011 and Kolovelonis et al., 2012). Indeed, Hatzigeorgiadis et al. (2011) showed that students generally have greater benefits of self-talk compared to novice and experienced athletes. Along with these positive effects found in preadolescent and undergraduate students, the present study focuses on adolescent students to extend the knowledge base on self-talk and physical education.

As well as examining nature of self-talk and task type, the current study examines self-efficacy as a mediator between self-talk and performance. Self-efficacy, defined as belief in one's capabilities to accomplish a task in a particular situation or situation-specific self-confidence (Bandura, 1977), has been strongly linked to performance in sport settings (Feltz, Short, & Sullivan, 2008). According to classical self-efficacy theory proposed by Bandura (1997), self-efficacy is affected by four major sources: past performance achievement, vicarious experience, verbal persuasion, and physiological state, and self-talk is particularly relevant to verbal persuasion. With a single-case, multiple baseline design, Landin and Hebert (1999) found that instructional self-talk could increase self-efficacy in a tennis task, providing preliminary support. Recently, Hatzigeorgiadis and colleagues implemented motivational self-talk training and observed that the training improved not only tennis performance, but also elevated self-efficacy (Hatzigeorgiadis, Zourbanos, Goltsios, & Theodorakis, 2008) and self-confidence (Hatzigeorgiadis, Zourbanos, Mpoumpaki, & Theodorakis, 2009). In addition, positive correlations between self-efficacy, self-confidence, and performance were also found (Hatzigeorgiadis et al., 2008 and Hatzigeorgiadis et al., 2009). These findings suggest that self-efficacy may mediate the self-talk and performance relationship. It is also important to consider the type/combination of self-talk and specific task characteristics to determine the role of self-efficacy in relation to the task-matching hypothesis (Hatzigeorgiadis et al., 2008, Hatzigeorgiadis et al., 2009 and Zetou et al., 2012).

Accordingly, the primary purpose of the present study was to examine the effect of self-talk on motor performance and whether the nature of self-talk or type of motor task would moderate the relationship between self-talk and performance. Specifically, two distinct types of self-talk, instructional and motivational, as well as two softball throwing tasks, throwing for accuracy (fine-motor) and throwing for distance (gross-motor) were examined. The second purpose was to investigate the role of self-efficacy in the relationship of self-talk and performance. In line with the task-matching hypothesis, it was hypothesized that instructional self-talk would result in better performance as well as higher self-efficacy on the fine-motor task, whereas motivational self-talk would show the greater performance and higher self-efficacy for the gross-motor task.

## Method

### Participants

Forty-two second-year senior high students (age range 15–18 years; $n$ = 11 girls, $n$ = 31 boys) were recruited from a local city in Taoyuan county, Taiwan. The participants had limited softball experience but were currently taking a softball class that met one time (50 min) per week for 10 weeks instructed by a coach of the softball team. Prior to the study, participants provided written informed consent approved by Institutional Review Board of National Taiwan Sport University. While the experiment was conducted during the softball classes, participants voluntarily agreed to participate without any compensation. Descriptive data are presented in Table 1.

**Table 1.** Demographic background for participants (mean ± standard deviation).

| Measures | Boys | Girls | Total |
|---|---|---|---|
| *n* | 31 | 11 | 42 |
| Age | 17.55 ± 0.57 | 17.27 ± 0.47 | 17.48 ± 0.55 |
| Height | 173.49 ± 5.30 | 160.62 ± 3.55 | 170.12 ± 7.51 |
| Weight | 67.76 ± 17.00 | 52.50 ± 3.77 | 63.76 ± 16.16 |
| BMI | 22.47 ± 5.41 | 20.36 ± 1.58 | 21.92 ± 4.79 |

*Note.* BMI = body mass index.

Nature of self-talk

The self-talk scripts were developed with a coach and three university faculty members with sport psychology background. The self-talk scripts were written on an instruction sheet and displayed to participants before performing the assigned motor task. Three types of self-talk (i.e., instructional, motivational, and unrelated self-talk), and two softball motor tasks (distance, accuracy) were included.

Instructional self-talk for the functional softball throwing for accuracy task included: see the target, aim at the target, raise the hand, hook the wrist, timing of throwing ball, feeling of concentration, feeling of coordination, and *smooth, relaxed movement,* and for softball overhand throwing for distance task: turning at the waist, planting the feet, releasing ball at 75°, switching the arms, smooth movement, focusing on velocity.

Motivational self-talk for both functional softball throwing for accuracy task and softball overhand throwing for distance task included: I can do it, I believe I can do it well, using all of my power, throwing as far (accurately) as I can, do my best, and *show the others how good I am.*

Lastly, unrelated self-talk included: *the weather, the pet's name, parent's name, and the color of clothes*.

Self-talk manipulation check

The self-talk manipulation check was based on Kolovelonis et al. (2011). The participant was given the self-talk check question by the experimenter after each performance attempt. The question was “Have you used the self-talk from self-talk sheet during the softball throwing for accuracy task/softball throwing for distance task?” The answer is either Yes or No.

## Motor performance measure

### Functional softball throwing for accuracy task

The task was a fine-motor task based on Davies and Dickoff-Hoffman (1993), used to assess ability to throw a softball toward an object. Specifically, the participant aimed to hit a target displayed on a pitching target area with nine blocks (1.5 × 1.5 m). The throwing distance was 10 m. During the task, the participant first took warm-up throws until he or she was ready to act. Then, the participant was instructed to throw to a target selected by drawing lots. The score for hitting the target (e.g., 5) was 5, score for hitting the other target areas within pitching target areas (e.g., 1, 2, 3) was 3, and score for not hitting any was 0. The participant was asked to throw as accurately as possible at the softball pitching target. Each participant had six throwing attempts with the target selected by drawing lots before each throw, with the average of the six scores used for further analysis.

### Softball overhand throwing for distance task

The task was a gross-motor field measure developed by Collins and Hedges (1978), used to determine muscular power and strength related to softball throwing. The task was conducted in a regular standard-sized softball court. During the task, the participant was instructed to perform warm-up throws until he or she felt ready to act (about 3–4 min). Three warm-up attempts with 30%, 60%, and 90% intensity of throwing were then performed down a throwing line. Then, the participant was asked to execute three maximal attempts for official testing and asked to throw as far as possible; the highest distance was identified for further analysis.

## Self-efficacy measure

A modified scale from Hardy, Hall, Gibbs, and Greenslade (2005) was used to assess self-efficacy. During the testing, the participant was asked to rate his/her confidence on performing the current motor task (i.e., either throwing for accuracy or distance) relative to the performance in the baseline condition. Specifically, the question was “how certain are you of performing this task as well as your best performance last time?” The scale was a 1-item scale with 5 points where 1 represented 20% confidence, 3 represented 60%, and 5 represent 100% confidence. The self-efficacy scores used in analysis were the average score of six attempts in the throwing for accuracy task, and the score of the best of three throwing for distance task performance in each of the instructional, motivational, and unrelated self-talk conditions.

## Experimental procedure

All participants completed three different experimental sessions within three weeks. In Session One, participants completed the questionnaire on demographic background and informed consent. They were then given a lecture and introduction to self-talk. In addition, they were instructed on the different types of self-talk and then selected one to use from descriptions provided by instructor. They were then administrated both the functional softball throwing for accuracy task and softball overhand throwing for distance task as baseline.

Participants completed Session Two (i.e., functional softball throwing for accuracy task) and Session Three (i.e., softball overhand throwing for distance task) with counterbalanced order. In Session Two, individuals experienced three self-talk conditions with counterbalanced order. For the instructional self-talk condition, the participant performed warm-up as in Session One and the pitching target was selected by drawing lots. Before they performed the official attempt, the experimenter displayed the instructional self-talk script. He/she selected one or two self-talk items from the script and then performed verbally and loudly for overt self-talk. Then, a self-efficacy measure was administrated prior to the official attempt. The self-talk manipulation check was then administrated to confirm the appropriate use of covert and specific self-talk following each official attempt. Each participant performed six official attempts, repeating the warm-up, target selection, self-efficacy measure, official attempt, as well as self-talk manipulation check steps.

Similar to Session Two, participants in Session Three experienced the same warm-up, target selection, self-efficacy measure, official attempts, as well as self-talk manipulation checks. Instead of performing the functional softball throwing for accuracy task, they performed the softball overhand throwing for distance task three times. Given that the throwing for distance task needed maximal efforts, three rather than six throwing attempts were used to prevent fatigue. In addition, participants were asked to conduct each attempt only when they felt ready. All softball tests used a standard softball (SB800Y) and were conducted in a regular softball court with monitoring by a coach and a physical education teacher.

Statistical analysis

The present study used a within-subject counterbalanced design. Separate one-way, repeated-measure analyses of variance (ANOVA) were conducted to compare the nature of self-talk (i.e., instructional, motivational, unrelated self-talk) conditions on softball throwing performance as well as softball accuracy performance. In addition, a separate one-way ANOVA was conducted to compare the three self-talk conditions on self-efficacy for softball throwing for accuracy and for distance performances. Significant effects were followed-up with multiple comparisons with Bonferroni correction, and Greenhouse–Geisser correction was performed to meet the sphericity assumption. Lastly, separate Pearson's correlations were conducted to determine the relationship between the self-efficacy score for accuracy and the accuracy task performance, as well as self-efficacy score for distance and the distance task performance. Partial eta-square was reported as effect size with significant differences. Significance level was set as alpha level of .05 prior to Bonferroni correction.

**Results**

Regarding the self-talk manipulation check, participants were able to use the self-talk requested for the specific condition during both motor tasks (98% answered Yes). The descriptive data on motor task performance as well as self-efficacy for the three conditions are presented in Table 2.

**Table 2.** Softball throwing performance and self-talk across three self-talk conditions (mean ± standard deviation).

| Variable | Baseline | Instructional | Motivational | Unrelated |
|---|---|---|---|---|
| Softball throwing for accuracy | | | | |
| Performance (points) | 5.81 ± 3.45 | 7.83 ± 3.72 | 6.40 ± 2.78 | 5.70 ± 3.14 |
| Self-efficacy | – | 4.31 ± 0.72 | 4.17 ± 0.79 | 2.83 ± 1.19 |
| Softball throwing for distance | | | | |
| Performance (meter) | 36.29 ± 11.67 | 37.88 ± 11.19 | 39.12 ± 11.55 | 37.56 ± 11.75 |
| Self-efficacy | – | 4.10 ± 0.85 | 4.50 ± 0.55 | 2.83 ± 1.06 |

Motor performance

A one-way ANOVA revealed a significant difference on softball throwing for accuracy performance among the three self-talk conditions, $F(2,82) = 5.55$, $p < .01$, partial eta-square = .13. Follow-up comparisons revealed that both instructional and motivational self-talk conditions, with no significant difference between them, had higher accuracy performance compared to unrelated self-talk $p < .01$ ( Fig. 1a).

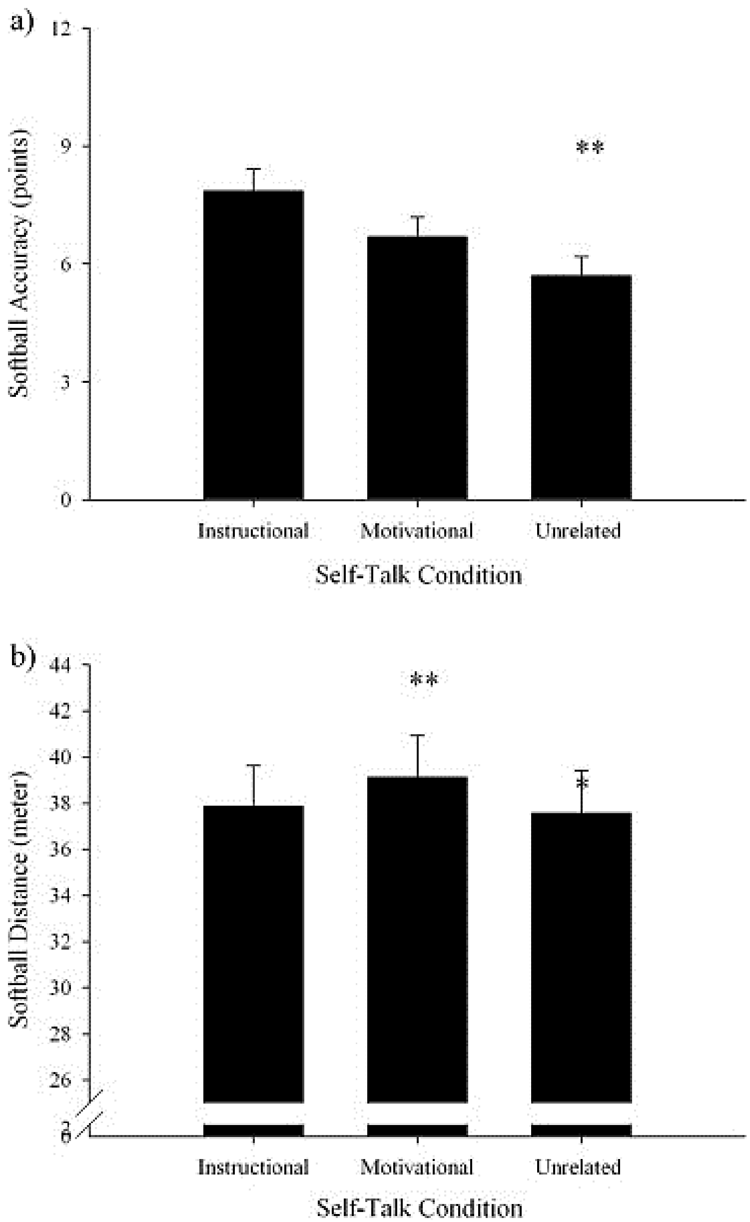


**Fig. 1.** Motor performance across three types of self-talk conditions in a) functional softball throwing for accuracy task; b) softball overhand throwing for distance task. The data were represented as mean and standard error. ## and ** represent the significant difference, $p < .001$. # and * represent the significant difference, $p < .05$.

Regarding softball throwing for distance performance, one-way ANOVA revealed a significant difference among the three self-talk conditions, $F(2,82) = 6.22$, $p < .01$, partial eta-square = .14. Follow-up comparisons revealed that the motivational self-talk condition had higher performance compared to instructional and unrelated self-talk ($p < .01$), and the latter two conditions were not significantly different ( Fig. 1b).

Self-efficacy

Similar to the accuracy performance results, a one-way ANOVA revealed a significant difference in self-efficacy for softball accuracy among the three self-talk conditions, $F(2,82) = 43.08$, $p < .001$, partial eta-square = .51. Follow-up comparisons revealed that both instructional and motivational self-talk conditions, with no significant difference, had higher self-efficacy compared to unrelated self-talk ( Fig. 2a).

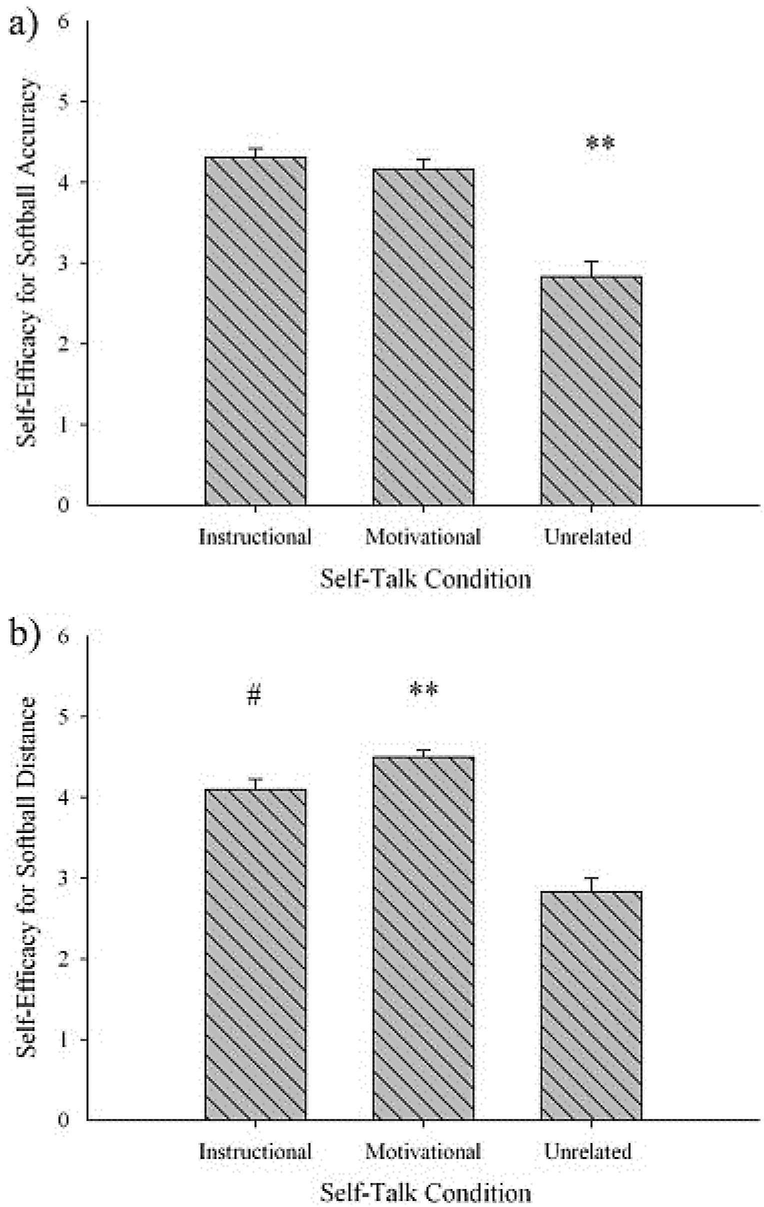


**Fig. 2.** Self-efficacy across three types of self-talk conditions in a) functional softball throwing for accuracy task; b) softball overhand throwing for distance task. The data were represented as mean and standard error. ## and ** represent the significant difference, $p < .001$. # and * represent the significant difference, $p < .05$.

Regarding throwing for distance self-efficacy, A one-way ANOVA revealed a significant difference among the three self-talk conditions, $F(2,80) = 52.91$, $p < .001$, partial eta-square = .56. Follow-up comparisons revealed that there were significant differences between each two conditions, with motivational self-talk having highest score followed by instructional self-talk and unrelated self-talk ($p$'s = 0.001–.02) ( Fig. 2b).

Lastly, Pearson's correlations revealed a moderate, positive relationship between degree of change in self-efficacy of accuracy and change in accuracy task performance ($r = .33$, $p < .001$). Similar results was also revealed in change of self-efficacy of distance and change in distance task performance ($r = .21$, $p = .02$).

**Discussion**

The main purpose of the present study was to identify the impact of two distinctive types of self-talk (i.e., instructional and motivational self-talk) on fine- and gross-motor tasks of softball throwing. In addition, the role of self-efficacy in self-talk and motor performance was also assessed. The results demonstrated that both instructional and motivational self-talk conditions led to better fine-motor softball throwing accuracy than the unrelated self-talk condition, whereas motivational self-talk had better performance in gross-motor softball throwing for distance compared to the other two conditions. Regarding self-efficacy, both instructional and motivational self-talk conditions led to higher softball throwing accuracy self-efficacy than unrelated self-talk, whereas motivational self-talk had the highest self-efficacy in the gross-motor related softball throwing for distance task. Furthermore, changes in self-efficacy in fine- and gross-motor tasks were positively associated with performance in the corresponding motor tasks.

Before further discussion, it should be pointed out that self-talk enhanced motor task in general, reflecting that self-task is a useful psychological skill to facilitate performance. However, our findings further suggest that the nature of self-talk and type of motor task moderate the effect of self-talk on performance, with both instructional and motivational self-talks leading to better fine-motor task performance and motivational self-talk particularly impacting gross-motor performance, supporting the task-matching hypothesis (Hardy et al., 2009 and Hatzigeorgiadis et al., 2011). Previous studies had revealed only instructional self-talk effects on fine-motor performance; nevertheless, the earlier study involved players with task-related experience such as soccer and badminton (Theodorakis et al., 2000). On the other hand, our finding that both types of self-talk are helpful is consistent with previous studies on students in physical education settings (Kolovelonis et al., 2011) or students who do not possess the task-related experience (Hatzigeorgiadis, 2006 and Hatzigeorgiadis et al., 2004). Taken together, it seems that experienced individuals receive more benefits from instructional cues for fine-motor tasks, whereas both instructional and motivational self-talk facilitate performance for inexperienced students on precise and novel motor tasks.

Our finding that motivational self-talk results in the best performance on a gross-motor task is in line with numerous studies that focus on athletes (Theodorakis et al., 2000) and students (Hatzigeorgiadis, 2006,Hatzigeorgiadis et al., 2004 and Kolovelonis et al., 2011). Hardy et al. (2001) proposed that motivational self-talk involves three sub-motivational functions including arousal, mastery, and drive. Specifically, motivational self-talk helps to regulate arousal (e.g., psych up, relaxation), prepare mentally for mastery challenge (e.g., mental toughness, confidence), and enhance drive. The motivational function may facilitate muscle and energy recruitment, and therefore lead to superior gross-motor performance when compared to instructional self-talk. Nevertheless, the motivational self-talk from our study also facilitated fine-motor task performance, which corresponds with other studies (Boroujeni and Shahbazi, 2011, Hatzigeorgiadis, 2006,Hatzigeorgiadis et al., 2004 and Kolovelonis et al., 2011). While participants should experience the same amount of self-talk practice in both conditions, given that the motivational self-talk is relatively similar for both tasks, whereas instructional self-talk differs across tasks, participants may have a greater amount of motivational self-talk, which in turn led to improvement in both throwing tasks. Along with previous studies that suggest practice may enhance the effect of self-talk (Hatzigeorgiadis et al., 2011), the argument may partly explain the effects of motivational self-talk. Accordingly, these studies and viewpoints suggest that self-talk that functions as motivation benefits both fine and gross motor performances.

A potential mediator role of self-efficacy was suggested by positive correlations between changes in self-efficacy and motor performance. Interestingly, effects of self-talk on self-efficacy had similar trends as the effects of self-talk on motor performance, which not only implies the role of mediator, but also partially supports the task-matching hypotheses for self-efficacy. Although previous research only implies that performance is facilitated by self-talk through the self-talk induced confidence (Hamilton et al., 2007 and Hatzigeorgiadis et al., 2004), the role of self-efficacy is further confirmed by recent studies on single self-talk. For example, Zetou et al. (2012) indicated that instructional self-talk enhanced both volleyball service skill and self-efficacy. Furthermore, Hatzigeorgiadis and colleagues argued that motivational self-talk improves tennis skill, self-efficacy, and self-confidence (Hatzigeorgiadis et al., 2008 and Hatzigeorgiadis et al., 2009). Our study extends the current knowledge base by suggesting that self-efficacy is a mediator of self-talk and motor task performance, and additionally presents a task-matching trend between self-efficacy and motor tasks.

Hardy et al. (2009) outlines a framework for the study of self-talk, in which self-talk may lead to superior motor performance through cognitive (e.g., concentration, attention), motivational (e.g. self-efficacy, motivation) behavioral (e.g., technique), and affective (e.g., affect, anxiety) mechanisms. While self-efficacy was involved in motivational mechanisms, it is noteworthy that self-efficacy was associated with other mechanisms. For example, links between self-efficacy and cognitive processes, specifically decision-making, have been recently observed, in that Hepler and Feltz (2012) found that self-efficacy significantly and consistently predicted baseball decision speed. In the behavioral dimension, individuals with high self-efficacy take more challenging goals (Bandura, 1997) and demonstrate better self-regulation (Kane, Marks, Zaccaro, & Blair, 1996). Lastly, research has not only shown a negative correlation between self-efficacy and anxiety (Cartoni, Minganti, & Zelli, 2005), but also shown a predictor and causal link of self-efficacy to anxiety through regression and path analyses (Haney and Long, 1995 and LaGuardia and Labbe, 1993). Given that these self-efficacy related factors (e.g., decision-making, goal-setting, self-regulation, and anxiety) are antecedents to superior performance, self-efficacy has been recognized as a main determinant of successful performance (Moritz, Feltz, Fahrbach, & Mack, 2000). Self-efficacy theory proposes that self-talk leads to self-efficacy and that self-efficacy is the key mediator of performance. Thus, self-efficacy may play the central role in explaining the relationship between self-talk and motor performance, and our findings are in line with those arguments.

Some limitations should be mentioned when interpreting the results of the present study. While the self-talk conditions operated appropriately based on the self-talk manipulation check (with at least 95% cue-correspondent rate for each self-talk), it is possible that both instructional and motivational self-talk appear simultaneously during task performance. Confirmation of both types as well as content analysis for specific self-talk conducted by Kolovelonis et al. (2011) is recommended to minimize the confounding influence. Additionally, the content of each specific self-talk script was developed by a coach and professional scholars. Based on self-determination theory, participants would perceive more intrinsic motivation when the content is self-selected. The lack of freely chosen self-talk may partly explain the failure to show the differences between instructional and motivational self-talk conditions in the fine-motor task, because participants need different instructional cues based on their current skills and abilities. Nevertheless,Weinberg et al. (2012) indicated that there were no significant differences between assigned and freely chosen self-talk, and participants in the present study share similar previous experience for the softball throwing task, suggesting the factors related to self-determination had only limited influence.

With the initial evidence of beneficial self-talk effects, future study is warranted with long-term intervention. Indeed, some studies have conducted relatively long-term self-talk programs (four to ten weeks) and support their effectiveness for sport performance (Hamilton et al., 2007, Hatzigeorgiadis et al., 2013 and Zetou et al., 2012). Examination of different performance tasks in varied settings is also warranted. For example, Martin, Vause, and Schwartzman (2005) indicated that self-talk research on competitive sport performances in reality is still limited. Alterative research lines could examine issues in broader settings such as academic settings, fitness in military environment, preventing sport and exercise injury, or progress in clinical rehabilitation.

In summary, the current study provides evidence that self-talk enhances motor performance for the adolescent student with novice experience on softball throwing tasks. Additionally, the nature of self-talk and type of motor task moderate the relationship between self-talk and motor performance, partially supporting the task-matching hypothesis. Furthermore, self-efficacy may not only be a potential mediator explaining the facilitated performance from self-talk, but also presents a task-matching trend of self-efficacy and motor performance. These findings have important implications in that teachers, coaches, consultants, and athletes should realize that while self-talk appears to be a promising cognitive strategy, it should be used while considering the nature of self-talk as well as the characteristics of the motor task to maximize effectiveness.

**References**


Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. Psychological Review, 84, 191e215.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.

Beneka, A., Malliou, P., Gioftsidou, A., Kofotolis, N., Rokka, S., Mavromoustakos, S., et al. (2013). Effects of instructional and motivational self-talk on balance performance in knee injured. European Journal of Physiotherapy, 15, 56-63. http://dx.doi.org/10.3109/21679169.2013.776109.

Boroujeni, S. T., & Shahbazi, M. (2011). The effect of instructional and motivational self-talk on performance of basketball's motor skill. Procedia-Social and Behavioral Sciences, 15, 3113e3117. http://dx.doi.org/10.1016/j.sbspro.2011.11.282.

Cartoni, A., Minganti, C., & Zelli, A. (2005). Gender, age, and professional-level differences in the psychological correlates of fear of injury in Italian gymnasts. Journal of Sport Behavior, 28, 3-17.

Collins, D. R., & Hedges, P. B. (1978). A comprehensive guide to sports skills tests and measurement. Springfield, IL: Charles C Thomas.

Dagrou, E., Gauvin, L., & Halliwell, W. (1992). The effects of positive, negative and neutral self-talk on motor performance. Canadian Journal of Sport Sciences, 17, 145-147.

Davies, G. J., & Dickoff-Hoffman, S. (1993). Neuromuscular testing and rehabilitation of the shoulder complex. The Journal of Orthopaedic and Sports Physical Therapy, 18, 449-458.

Edwards, C., Tod, D., & McGuigan, M. (2008). Self-talk influences vertical jump performance and kinematics in male rugby union players. Journal of Sports Sciences, 26, 1459e1465. http://dx.doi.org/10.1080/02640410802287071.

Feltz, D. L., Short, S. E., & Sullivan, P. J. (2008). Self-efficacy in sport. Champaign, IL: Human Kinetics.

Goudas, M., Hatzidimitrious, V., & Kikidi, M. (2006). The effects of self-talk on throwing and jumping events performance. Hellenic Journal of Psychology, 3,105-116.

Hamilton, R. A., Scott, D., & MacDougall, M. P. (2007). Assessing the effectiveness of self-talk interventions on endurance performance. Journal of Applied Sport Psychology, 19, 226e239. http://dx.doi.org/10.1080/10413200701230613.

Haney, C. J., & Long, B. C. (1995). Coping effectiveness: a path analysis of self-efficacy, control, coping, and performance in sport competitions. Journal of Applied Social Psychology, 25, 1726-1746.

Hardy, J. (2006). Speaking clearly: a critical reviewof the self-talk literature. Psychology of Sport and Exercise, 7, 81-97. http://dx.doi.org/10.1016/j.psychsport.2005.04.002.

Hardy, J.,Craig,R.,&Hardy, L. (2004).Anoteonathletes' use of self-talk. Journal ofApplied Sport Psychology, 16, 251-257. http://dx.doi.org/10.1080/10413200490498357.

Hardy, J., Gammage, K., & Hall, C. (2001). A descriptive study of athlete self-talk. The Sport Psychologist, 15, 306-318.

Hardy, J., Hall, C. R., Gibbs, C., & Greenslade, C. (2005). Self-talk and gross motor skill performance: an experimental approach. The Online Journal of Sport Psychology, 7, 1-13.

Hardy, J., Oliver, E., & Tod, D. (2009). A framework for the study and application of self-talk within sport. In S. D. Mellalieu, & S. Hanton (Eds.), Advances in applied sport psychology: A review (pp. 37-74). London: Routledge.

Harvey, D., Van Raalte, J., & Brewer, B. (2002). Relationship between self-talk and golf performance. International Sports Journal, 6, 84-91.

Hatzigeorgiadis, A. (2006). Instructional and motivational self-talk: an investigation on perceived self-talk functions. Hellenic Journal of Psychology, 3, 164-175.

Hatzigeorgiadis, A., Galanis, E., Zourbanos, N., & Theodorakis, Y. (2013). Self-talk and competitive sport performance. Journal of Applied Sport Psychology. http:// dx.doi.org/10.1080/10413200.2013.790095.

Hatzigeorgiadis, A., Theodorakis, Y., & Zourbanos, N. (2004). Self-talk in the swimming pool: the effects of self-talk on thought content and performance on water-polo tasks. Journal of Applied Sport Psychology, 16, 138-150. http://dx.doi.org/10.1080/10413200490437886.

Hatzigeorgiadis, A., Zourbanos, N., Galanis, E., & Theodorakis, Y. (2011). Self-talk and sports performance: a meta-analysis. Perspectives on Psychological Science, 6, 348-356. http://dx.doi.org/10.1177/1745691611413136.

Hatzigeorgiadis, A., Zourbanos, N., Goltsios, C., & Theodorakis, Y. (2008). Investigating the functions of self-talk: the effects of motivational self-talk on self efficacy and performance in young tennis players. The Sport Psychologist, 22,458-471.

Hatzigeorgiadis, A., Zourbanos, N., Mpoumpaki, S., & Theodorakis, Y. (2009). Mechanisms underlying the self-talk-performance relationship: the effects of motivational self-talk on self-confidence and anxiety. Psychology of Sport and Exercise, 10, 186-192. http://dx.doi.org/10.1016/j.psychsport.2008.07.009.

Hepler, T. J., & Feltz, D. L. (2012). Take the first heuristic, self-efficacy, and decision making in sport. Journal of Experimental Psychology, 18, 154-161. http://dx.doi.org/10.1037/a0027807.

Johnson, J. J. M., Hrycaiko, D. W., Johnson, G. V., & Halas, J. M. (2004). Self-talk and female youth soccer performance. The Sport Psychologist, 18, 44-59.

Kane, T. D., Marks, M. A., Zaccaro, S. J., & Blair, V. (1996). Self-efficacy, personal goals, and wrestlers' self-regulation. Journal of Sport and Exercise Psychology, 18, 36-48.

Kolovelonis, A., Goudas, M., & Dermitzaki, I. (2011). The effects of instructional and motivational self-talk on students' motor task performance in physical education. Psychology of Sport and Exercise, 12, 153-158. http://dx.doi.org/10.1016/j.psychsport.2010.09.002.

Kolovelonis, A., Goudas, M., & Dermitzaki, I. (2012). The effects of self-talk and goal setting on self-regulation of learning a new motor skill in physical education. International Journal of Sport and Exercise Psychology, 10, 221e235. http://dx.doi.org/10.1080/1612197X.2012.671592.

LaGuardia, R., & Labbe, E. E. (1993). Self-efficacy and anxiety and their relationship to training and race performance. Perceptual and Motor Skills, 77, 27-34.

Landin, D., & Hebert, E. P. (1999). The influence of self-talk on the performance of skilled female tennis players. Journal of Applied Sport Psychology, 11, 263-282. http://dx.doi.org/10.1080/10413209908404204.

Martin, G. L., Vause, T., & Schwartzman, L. (2005). Experimental studies of psychological interventions with athletes in competitions why so few? Behavior Modification, 29, 616e641. http://dx.doi.org/10.1177/0145445503259394.

Moritz, S. E., Feltz, D. L., Fahrbach, K. R., & Mack, D. E. (2000). The relation of self efficacy measures to sport performance: a meta-analytic review. Research Quarterly for Exercise and Sport, 71, 280-294. http://dx.doi.org/10.1080/02701367.2000.10608908.

Oliver, E. J., Markland, D., & Hardy, J. (2010). Interpretation of self-talk and post lecture affective states of higher education students: a self-determination theory perspective. British Journal of Educational Psychology, 80, 307-323. http://dx.doi.org/10.1348/000709909X477215.

Theodorakis, Y., Weinberg, R., Natsis, P., Douma, I., & Kazakas, P. (2000). The effects of motivational versus instructional self-talk on improving motor performance. The Sport Psychologist, 14, 253-271.

Tod, D. A., Hardy, J., & Oliver, E. (2011). Effects of self-talk: a systematic review. Journal of Sport and Exercise Psychology, 33, 666-687.

Tod, D. A., Thatcher, R., McGuigan, M., & Thatcher, J. (2009). Effects of instructional and motivational self-talk on the vertical jump. Journal of Strength and Conditioning Research, 23, 196-202.

Van Raalte, J. L., Brewer, B.W., Lewis, B. P., & Linder, D. E. (1995). Cork! The effects of positive and negative self-talk on dart throwing performance. Journal of Sport Behavior, 18, 50e57.

Weinberg, R., Miller, A., & Horn, T. (2012). The influence of a self-talk intervention on collegiate cross-country runners. International Journal of Sport and Exercise Psychology, 10, 123-134. http://dx.doi.org/10.1080/1612197X.2012.645135.

Zetou, E., Vernadakis, N., Bebetsos, E., & Makrari, E. (2012). The effect of self-talk in learning the volleyball service skill and self-efficacy improvement. Journal of Human Sport and Exercise, 7, 794-805. http://dx.doi.org/10.4100/jhse.2012.74.07.