The Effects of Self-Talk on Dominant and Nondominant Arm Performance on a Handball Task in Primary Physical Education Students

Nikos Zourbanos, Antonis Hatzigeorgiadis, Dimitris Bardas, and Yannis Theodorakis
University of Thessaly

The present study examined the effects of instructional and motivational self-talk on handball performance using a novel task (nondominant arm) and a learned task (dominant arm) in primary school students. Participants were randomly assigned into two experimental groups (instructional and motivational) and one control group. The results revealed that for both tasks instructional and motivational self-talk groups improved their performance significantly in comparison with the control group and that for the nondominant arm instructional self-talk had a larger effect compared with motivational self-talk. The results suggest that instructional self-talk in the form of external focused cues may be more beneficial in the early stages of learning.

The effects of self-control techniques to handle dysfunctional patterns of behavior or to enhance performance by directing one’s attention have been viewed as critical in cognitive-behavioral methods of clinical and experimental interventions (e.g., Meichenbaum, 1977; Kanfer & Stevenson, 1985). In sport psychology, a self-control technique that has been found to improve task performance in sport (Mallett & Hanrahan, 1997; Landin & Hebert, 1999) and physical education (e.g., Anderson, Vogel, & Albrecht, 1999; Kolovelonis, Goudas, & Dermizaki, 2011) is self-talk. This self-control technique involves the use of cue words aiming at facilitating learning and enhancing performance through the stimulation of appropriate responses (Hatzigeorgiadis, Zourbanos, Galanis, & Theodorakis, 2011). Research has provided evidence that self-talk can improve motor performance using a variety of tasks and settings (for review, see Theodorakis, Hatzigeorgiadis, & Zourbanos, 2012). Recently, Hatzigeorgiadis et al. (2011) using a meta-analytic approach revealed a positive moderate effect size ($ES = .48$), confirming the effectiveness of self-talk interventions in enhancing task performance.

In one of the first experimental studies using instructional and motivational self-talk, Theodorakis, Weinberg, Natsis, Douma, and Kazakas (2000) suggested the matching hypothesis. They argued that for tasks requiring skill, precision, and timing, instructional self-talk should be more effective than motivational self-talk, whereas for tasks requiring strength or endurance, motivational self-talk should be more effective than instructional self-talk. In a series of experiments, they found that instructional self-talk was indeed more effective for tasks requiring skill and precision, whereas for tasks requiring strength or endurance, instructional and motivational self-talk was equally effective. Subsequent studies testing the matching hypothesis through direct comparisons of instructional and motivational self-talk have in some cases provided support (e.g., Hatzigeorgiadis, Theodorakis, & Zourbanos, 2004) and in others not (e.g., Goudas, Hatzidimitriou, & Kikidi, 2006). Hatzigeorgiadis et al. (2011) in a meta-analysis on the effects of self-talk on performance provided partial support for the matching hypothesis, revealing that instructional self-talk was more effective for tasks requiring precision, compared with tasks requiring strength. In addition, for tasks requiring precision, instructional self-talk was more effective than motivational self-talk. Finally, for tasks requiring strength, the effect of motivational self-talk was not significantly higher than that of instructional self-talk. Hatzigeorgiadis, Zourbanos, and Theodorakis (2007) noticed that depending on parameters of the task, some self-talk cues can be more effective than others, explaining the equivocal results on the matching hypothesis. One of the possible parameters that may moderate the effectiveness of self-talk is the task familiarity. Hatzigeorgiadis et al. (2011) hypothesized that the use of self-talk would be more effective at the early stages of learning (novel task) compared with the later stages (learned task). The meta-analysis showed that novelty of the task was a marginally significant moderator: the effect for novel tasks ($d = .73$) tended to exceed that of the learned tasks ($d = .41$), suggesting that familiarity of the task might moderate the self-talk–performance relationship.
According to stages of learning, there are three phases (acquisition, compilation, autonomous) of skill development (for more details, see Fitts & Posner, 1967; Sincoff & Sternberg, 1989). When a new skill is learned (acquisition phase, or earlier stages of learning), one’s attention is placed on the movement of the skill. In the acquisition phase, given the lack of expertise, movements are consciously controlled and effortfully produced. Beilock, Carr, MacMahon, and Starkes (2002), in a study with skilled performers, argued that when practicing (earlier stages of learning) or attempting to correct a skill one’s attention using external focused cues may be placed on the movement of the skill itself. The use of explicit cues in the form of instructional self-talk, that direct attention to the desired movement, may be beneficial for performer’s attention and his or her performance. Similar results were observed with novice participants. Wulf, Lauterbach, and Toole (1999) revealed that the external focused group who were instructed to focus on the pendulum-like motion of the club enhanced the accuracy of the shots relative to an internal focused group, which was instructed to focus on the swing of their arms. Very recently, Zourbanos, Hatzigeorgiadis, Bardas, and Theodorakis (2012) revealed that primary physical education (PE) students who used instructional self-talk in the form of explicit cues had a larger improvement in their performance in a soccer task compared with the control group. Although the effects of instructional external focused self-talk on learned or novel tasks have received research attention, research has yet to explore the interplay between motivational self-talk and the different stages of learning. When a skill is well learned (later stages of learning), which is usually performed automatically with little effort, motivational self-talk might be more effective than instructional self-talk. Moreover, motivational self-talk in the form of positive self-evaluation demands less attention, when optimal task performance is already experienced (Wulf & Lewthwaite, 2010) and also improves confidence (e.g., Johnson, Hrycaiko, Johnson, & Hallas, 2004).

Considering that at the early stages of learning instruction and concentration are of particular importance, we developed a new matching hypothesis in a task requiring more timing and precision than strength. In particular, it was hypothesized that instructional self-talk would be more effective for novel tasks (earlier stages of learning) based on Wulf and Lewthwaite’s (2010) suggestions and Zourbanos et al.’s (2012) results of the beneficial effects of instructional self-talk in the form of explicit cues in performance, whereas motivational self-talk would be more effective for learned tasks (later stages of learning), which are usually performed automatically and demand less attention, which is a characteristic of skilled performance (Wulf & Lewthwaite, 2010). To test this hypothesis, an overarm throw in handball using the dominant arm (as a learned task) and the nondominant arm (as a novel task) was used with primary PE students. Handball is among the sports taught in primary physical education classes and an overarm throw with the dominant arm is a typical feature of handball, which participants had been taught. However, the use of the nondominant arm to throw the ball is a task that the students had not been taught. We hypothesized that (a) for the dominant arm, performance of the motivational self-talk group will improve more compared with that of the instructional self-talk group, whereas performance of the control group will not improve, and (b) for the nondominant hand, performance of the instructional self-talk group will improve more compared with that of the motivational self-talk group, which will improve more than that of the control group (improvement was also expected for the control group as this was a novel task).

Method

Participants

Forty physical education students (24 males and 16 females) from primary school aged 10–12 years (\(M = 11.28, SD = .82\)) participated in the study. Students were asked to sign consent forms, along with their PE teachers and parents. All students were informed that participation was voluntary, and, after providing information consent, they were assured that confidentiality would be maintained. Participants were randomly assigned into three groups: a motivational self-talk group (\(n = 10\)), an instructional self-talk group (\(n = 10\)) and a control group (\(n = 20\)).

Measures

Overarm Throw. The performance test involved a handball overarm throw aiming at a target. Handball is among the sports taught in primary PE classes and an overarm throw is a typical feature of handball, which participants had been taught. One target (35 × 50 cm) was placed at the top of a handball post. Participants were throwing from a distance of 6.5 m (marked spot opposite to the center of the target), and were asked to perform eight throws. The total of successful throws (1 point for each successful throw) was the score for each trial. All participants were tested four times (one baseline trial and three experimental trials) using their dominant arm (learned task) and their nondominant arm (novel task).

Procedures

Permission to conduct the study was obtained by the institution’s research ethics committee and from the school principals. The study was conducted in the school yard with the presence of the experimenter. Participants were initially informed that for this lesson they were going to participate in a program aiming to assess their handball abilities. Subsequently, the procedures regarding the evaluation were explained, and participants were allowed to make questions with regard to these procedures. For the baseline assessment, participants performed two sets (one set for the dominant arm and one set for the nondominant
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arm) of eight throws. Before the start of these sets, participants were asked to perform three throws with each arm for familiarization. Subsequently, they performed the baseline sets for the dominant and the nondominant arms in counterbalanced order. Upon completion of the baseline sets, participants were randomly assigned into three groups that were randomly assigned as motivational self-talk, instructional self-talk, and control groups. The two experimental groups followed similar protocol for the next three trials. Participants in the experimental groups were introduced to the use of self-talk and were informed that they were going to use this strategy for the next sets. All participants performed three sets of eight throws for each hand in counterbalanced order. One experimental group used instructional self-talk (“ball—target”), whereas the other used motivational self-talk (“I can”). The choice of the cue words was made based on previous self-talk studies with tasks involving aiming at a target (e.g., Theodorakis et al., 2000; Hatzigeorgiadis et al., 2004). Students were asked to repeat the word ball to remind themselves to catch the ball with their fingers and then the word target to focus on the direction of the target. These cue words were intended to help students focus their attention effectively on the task. Furthermore, using external focused cues such as “ball—target,” we aimed to direct performers’ attention to their movement and the outcome rather than using body-related cues such as “fingers” or “bend your wrist,” which are aimed to direct attention to body movements and which tend to constrain their motor system and interfere with automatic control processes (Wulf & Lewthwaite, 2010). Regarding the motivational cues, students were asked to repeat the cue “I can” to enhance their confidence and motivate them to enlist the necessary power to execute the motion. After the completion of the three sets for both arms, 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 instructed cue (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). The same procedures were followed for the nondominant arm as well. For the control group, participants were asked (a) to report whether they were thinking of something specific during the execution of the task; (b) if so, what this was; and (c) if so, the degree to which they used this other cue (1 = not at all, 10 = all the time). To prevent contact between participants from different groups, the three groups were isolated and tested separately on the same occasion. After the conclusion of the experimental procedures, participants were explained the purpose of the study and were thanked for their participation.

Results

Manipulation Checks

Regarding the use of the cues from the experimental groups, examination of the means revealed that participants in the motivational and instructional self-talk made adequate use of self-talk (M = 8.70, ±2.03 and M = 7.30, ±2.16, respectively). Regarding the control group, it was revealed that five students from the control group reported using some form of self-talk (e.g., come on, focus, let’s go) during the trials but not in a systematic way (scores ranging from 2 to 4). Based on the limited use of this spontaneous general self-talk of the control group, we decided to keep the data from the five participants.

Baseline Differences

Kolmogorov–Smirnov and Shapiro–Wilk tests showed that the assumption of normality was met within each group. One-way ANOVAs were conducted to test for differences for the baseline measure between the experimental and the control groups. The analysis showed that there were no significant differences for the dominant, F (2, 37) = 0.62, p = .55, and the nondominant arm, F (2, 37) = 0.31, p = .74. Mean scores are presented in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M ± SD</td>
<td>d</td>
<td>M ± SD</td>
<td>d</td>
</tr>
<tr>
<td><strong>Dominant Arm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Control</td>
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<td>-.10</td>
<td>5.10 ± 2.10</td>
<td>.32</td>
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<td>5.70 ± 1.83</td>
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<td>.71</td>
<td>6.10 ± 1.52</td>
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<td></td>
<td></td>
<td></td>
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<tr>
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<td>1.95</td>
<td>4.10 ± 2.02*</td>
</tr>
</tbody>
</table>

*Significantly different from baseline.
Performance for the Dominant Arm (Learned Task)

A two-way (3 groups × 4 trials) repeated-measures ANOVA was performed to identify differences in the patterns of performance across the four trials between the two experimental and the control groups. The analysis yielded a multivariate time by group interaction effect that approached significance, \( F(6, 72) = 1.98, p = .08, \eta^2 = .14, \) observed power = .69. Due to the meaningful size of the effect, the pairwise comparisons were considered using Bonferroni correction. They showed that (a) for the control group there were no differences between the baseline and subsequent performance measures, (b) for the motivational self-talk group there were significant differences between the baseline measure and Experimental Measure 2, and (c) for the instructional self-talk group there were no differences between the baseline and subsequent performance measures. Cohen’s \( d \) was calculated to reveal the size of the effect for the motivational and instructional groups. The analysis showed similar effect sizes. In particular, the average effect size for the motivational group was .76 and for the instructional group, .71. The statistics for all pairwise comparisons and the respective effect sizes are presented in Table 1.

Performance for the Nondominant Hand (Novel Task)

A two-way (3 groups × 4 trials) repeated-measures ANOVA was performed to identify differences in the patterns of performance across the four trials between the two experimental and the control groups. The analysis yielded a significant multivariate time by group interaction effect that \( F(6, 72) = 2.38, p < .05, \eta^2 = .17, \) observed power = .78. The pairwise comparisons with Bonferroni correction showed that (a) for the control group there were no differences between the baseline and subsequent performance measures, (b) for the motivational self-talk group there were significant differences between the baseline measure and Experimental Measure 2, and (c) for the instructional self-talk group there were significant differences between the baseline measure and all subsequent performance measures. Cohen’s \( d \) was calculated to reveal the size of the effect for the three groups. The analysis showed that instructional self-talk had a larger effect compared with motivational self-talk, which had a larger effect compared with the control group. In particular, the average effect size for the motivational group was 1.48; for the instructional group, 1.95; and for the control group, .33. The statistics for all pairwise comparisons and the respective effect sizes are presented in Table 1.

Discussion

The present study examined the effects of instructional and motivational self-talk on a novel and a learned task in primary physical education students. Overall, the results showed that for both tasks instructional and motivational self-talk groups improved their performance significantly in comparison with the control group.

With regard to the matching hypothesis that was made, the hypothesis for the novel task was confirmed. Instructional self-talk is described as self-talk aiming mostly at providing direction and enhancing concentration (Landin, 1994). As concentration is of particular importance at early stages of learning, the use of instructional self-talk was more beneficial for the novel task, compared with the motivational self-talk and the control group. That performance of the control group did not improve adds to the credibility of the study, as it supports the design principles that have been employed, including the use of random allocation and counterbalancing. Based on the stages of learning framework, in a novel task (early phase of skill development), one’s attention is placed on the movement of the skill itself. The use of instructional self-talk in the form of explicit cues likely directed students’ attention to the outcome of the skill, which helped them to improve their performance compared with the motivational self-talk group. Research into the effects of attentional focus has shown that external focus of attention has been shown to result in greater accuracy and enhanced physical and mentally efficiency (Wulf & Lewthwaite, 2010). The matching hypothesis for the learned task was not fully supported. The results showed that motivational self-talk was more beneficial for the learned task, compared with the instructional self-talk. Zinsser, Bunker, and Williams (2006) suggested that motivational self-talk can be more beneficial for psyching-up and persistence. In the current study, motivational self-talk was selected because motivational self-talk has been considered more effective for motivational outcomes. However, the average effect size for the motivational group was .76 and for the instructional group, .71. For the lack of differences between them, it could be argued that the task was learned but maybe not mastered, so that instructional and motivational functions of self-talk were equally important. Wulf and Lewthwaite (2010) suggested that exploration of the possible role of positive self-evaluation for facilitation of automatic control is currently limited. To some extent it is possible to say that this suggestion was partially confirmed for the motivational group due to the significant differences between the baseline measure and Experimental Measure 2. However, extreme caution is necessary when interpreting this finding. Furthermore, for the instructional self-talk group, there were no differences between the baseline and subsequent performance measures. Beilock et al. (2002) argued that for experienced performers, such as golfers and soccer players at later stages of performance, the direction of attention to components of a skill may be detrimental to performance at least in situations where maximum performance is the desired outcome. As it was stated earlier, conscious information processing is required at least in the early stages of learning for the learner to develop the acquisition of the proper technique, whereas in later stages of learning, automatic control processes are assumed to play a role. Consequently, Wulf and Prinz (2001) suggested that “feedback should
be provided in a way that allows learners to consciously attend to their intrinsic feedback in order to detect and correct errors themselves later” (p. 658). Nevertheless, the identification of this finding highlights an avenue where additional research should continue to facilitate our understanding of the effects of instructional and motivational self-talk on learned tasks.

The present study adds valuable evidence for the effectiveness of self-talk in primary school children (Zourbanos et al., 2012). Anderson et al. (1999) applied a nine-session self-talk training program during physical education classes over a 3-week period, to test learning effects on an overhand throw. They reported that the self-talk training group performed better than a traditional learning and a demonstration-only group. Kolovelonis et al. (2011) was the first study that examined the effectiveness of different types of self-talk in primary physical education students. They revealed that students who used self-talk, regardless of its type, improved their posttest performance in both tests compared with pretest, whereas control group students did not improve. More research is needed to determine which types of self-talk are more appropriate for young children for performance enhancement (e.g., Zourbanos et al., 2012).

Tod, Oliver, and Hardy (2011) argued that self-talk researchers should ground future research within theories. Drawing from the above it can be argued that there is evidence for a new matching hypothesis that matches different types of self-talk with the stages of learning and the external/internal focus theory, which should be further tested. Hatzigeorgiadis et al. (2011) hypothesized that the use of self-talk would be more effective at the early stages of learning (novel task) compared with the later stages (learned task). The results of the current study provided further support for the differential effects of self-talk on performance depending on the combination of self-talk and individual differences, suggesting that in young children instructional self-talk in the form of external focused cues may be more effective than motivational self-talk for novel tasks compared with learned tasks. Given the exploratory nature of the study, there are a number of limitations that further research should address. First, the findings are limited to primary students at present. We chose to limit the investigation to primary students to avoid the threat of age confound particularly in relation to performance. Of course, such control comes at a cost in generalizability and more research is needed to determine which types of self-talk match with different stages of learning across other ages and different environments such as sport or laboratory settings. Future research has yet to explore the effects of instructional self-talk using external focused cues on different stages of learning using electroencephalography (EEG) during performance. The use of EEG would offer us more insight to the brain regions that are activated when participants use motivational or instructional self-talk in the form of external or internal focused cues. However, given the potential for artifact to be produced when EEG is attempted with movement tasks, care needs to be taken to ensure the acquisition of valid EEG data with such a study. Continuing to develop and test theoretically sound grounded hypotheses with potential relevance to self-talk to some extent is useful in that it allows researchers to continue to improve self-talk research as they learn more about this self-control technique.

The practical importance of this study is clear. The results of the current study provide evidence that task familiarity moderates the self-talk–performance relationship. Furthermore, the results confirmed that self-talk can be an effective performance-enhancing strategy for young children. Further research is warranted to examine the implementation of interventions including instructional and motivational self-talk using different forms of internal and external focused cues under different stages of learning and motor tasks.

References


