Verbal encouragement does not improve maximal isometric hand grip strength in male judokas. A short report

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Summary

Introduction. The aim of this study was to investigate the effect of verbal encouragement (VE) on maximal isometric dominant hand grip strength (HGS) in male judo players.

Material and methods. Using hand grip dynamometer, twelve male senior judokas of various body mass were assessed over 2 successive days. On each day, their maximal HGS was examined in a randomized order under 2 conditions, with VE from the coach and without VE. Both trials were separated by a 10-minute rest period, and each trial consisted of 3 attempts with a 2-minute intermission between trials. A two-way ANOVA (trial x day) was employed for detection of main effects.

Results. Our calculations revealed that neither condition, nor the day of testing significantly affected HGS. The athletes reported a debilitating effect of VE on their attention focus and slightly lower scores were obtained during VE. Somewhat higher scores in HGS were noted on the second day, compared to the first, but the differences were not significant.

Conclusion. In male judo player maximal HGS was not influenced by VE from the coach.

Introduction

When examining physical capacity using maximal, volitional static or dynamic efforts, it is not clear whether the resultant effort by an exerciser is really a maximal one. Unpleasant body and mind sensations like muscle pain, shortness of breath, vomiting, elevated anxiety and fear may limit one’s full engagement and motivation to perform a physical task at maximal intensity. However, in the case of official competitions, post-effort exhaustion as reflected by a fall on a ground or syncope may provide some evidence of full task engagement. An additional contributor to physical performance is verbal encouragement (VE). Although some studies have revealed better execution of physical performance in the presence of VE, others have shown no such effect. An additional contributor to physical performance is verbal encouragement (VE). Although some studies have revealed better execution of physical performance in the presence of VE, others have shown no such effect. The disparate results can be explained by the use of various methodologies, the examined groups and physical tests.

The earliest study [1] showed that VE during a maximal running test on a treadmill resulted in significant higher maximal oxygen uptake (VO₂max), longer run time, higher maximal heart rate and blood lactate level (LA) in non athletes, while in competitive runners VO₂ and LA were not affected by VE. Interestingly, the benefits of VE strongly depend on its frequency during a maximal physical test. When the frequency was relative low (every 180 seconds), performance did not differ from a control condition without VE, but the higher frequency feedback (of 20 and 60 seconds) had a positive influence on performance and the other physiological indices [2]. Studies examining the effects of VE on Wingate test performance have provided contradictory results. In male non-athletes, anaerobic power, slope of power and total work output during VE was significantly higher when compared to a treatment condition without VE [3]. On the other hand, female athletes and non-athletes showed no changes (with VE) in various biomechanical parameters recorded during a Wingate test [4].

Studies examining voluntary forces during grip testing, performed as fast and maximal contractions, reported a significant effect of VE on both kinetic parameters [5]. VE also improved elbow flexion strength in male and female athletes [6], and produced somewhat better performance in rugby players during bench press exercises [7]. However, there are studies showing that VE does not always yield performance benefits in exercising humans. The effect seems to be dependent upon various circumstances accompanying the physical efforts, and on personality and temperamental features.

One may expect that athletes with strong intrinsic motivation do not need additional feedback to elicit maximal voluntary muscle actions. These subjects are defined as perfectionists, or individuals with personality type A. That suggestion has been confirmed by Chitwood (1997) who investigated the...
influence of VE on running time to exhaustion on a motor-driven treadmill. VO\textsubscript{2} and heart rate were monitored in subjects with type A- and B-type personalities. In type A group, performance did not improve with VE, while the type-B group produced a longer time trial and higher end-exercise HR. Moreover, there were no between-group differences in performance and biological activity with VE, but the type A group had superior outcomes (vs type B) without VE [8]. Interestingly, a personality-dependent effect of VE has been documented by Bing-boa [9]. In elite athletes with higher conscientiousness scores (CV), VE provided concurrently with maximal voluntary contractions (MVC) of plantar flexion resulted in somewhat lower (non significant MVC in comparison) scores than without VE. In contrast to that behavior, athletes with lower CV showed no beneficial effect with verbal feedback. Also, Mc Worther [10] found the opposite effect of VE, with knee extension isometric torque production depending on extraverted or introverted personality among girls. VE provided by the evaluator and their peers improved strength in extraverted girls (by 9.7%), but impaired it (by 2.5%) in the introverted group. All these results seem to examine the level of conscientiousness (using Five Factor Personality Traits) prior to physical laboratory tests, and especially prior to a competition, to avoid using external verbal motivation, which may be harmful for those contestants with higher conscientiousness and introversion scores.

Hand grip strength (HGS) in judo players plays a crucial role during training and competitive struggles. Almost all offensive and defensive actions in this sport require gripping of a judogi [11-13], with stronger HGS leading to more successful actions, like throws or immobilization. It is important to note that excessive judo training drills, like sparing fights, may bring about accumulation of local fatigue and impair HGS [14]. Thus, examination of these parameters over training period has high diagnostic potential. On the other hand, the extent of engagement during this test may depend on VE as mentioned above, which may itself provide information on current motivational state. Although there are number investigations concerning HGS assessments in judo players, the additional effect of external VE on physical performance has not been examined. Therefore, the present study investigated the influence of VE from a coach on HGS in judoists.

**Material and methods**

Twelve senior male judo players were examined on 2 successive days during a conditioning camp, which as characterized by mild daily physical loads. They were assigned into 2 groups and on each day both groups performed a forenoon (9:00-10:00 am) test of HGS for the dominant hand. Before the study, the athletes were familiarized with the test procedures, involving repeated efforts with a grip dynamometer (GRIP-D TTK 5401, Takei Scientific Instruments CO) and the selection of optimal gripping distance. Each test was conducted with VE (VE-HGS) and without (no-HGS), and these trials were executed in a randomized order with 10-minute rest period between them. The same procedure was applied on the next day. Each test consisted of 3 attempts with 2-minute intermission period between them. The mean values obtained from the 3 attempts were used analysed. The results were examined using a 2-way analysis of variance or ANOVA (2 tests x 2 days). The subjects were volunteers and the study protocol was approved by the Ethics Committee of the Institute of Sport.

**Results**

Descriptive statistics for HGS recorded during 4 situations are provided in Table 1. Comparison between the HGS means (analysed using ANOVA) is displayed in Table 2.

Statistical testing showed a lack of significant differences between HGS under the VE and non-VE conditions, as well as a non-significant day effect. However, slightly higher mean HGS was observed on the second day (53.1 kg) in comparison to the previous day (51.7 kg). Likewise, somewhat higher mean HGS was detected when the players did not receive VE. After completing this investigation, majority of athletes reported that VE disturbed their attention when executing the task at hand. Moreover, all athletes made mild efforts to improve their outcomes during successive trials, regardless of the presence of VE. HGS was significantly and positively correlated (p=0.01, r=0.667) with body mass.

**Discussion**

In this study, mean HGS showed was similar to that reported by Franchini, who also investigated elite judo players [11]. In order to compare the data reported by the other authors,

<table>
<thead>
<tr>
<th>Situations</th>
<th>Day 1</th>
<th>Day 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>VE-HGS</td>
<td>51.3±6.0</td>
<td>52.8±6.1</td>
</tr>
<tr>
<td>No-HGS</td>
<td>52.1±5.6</td>
<td>53.4±5.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source of variance</th>
<th>F-value</th>
<th>p-value</th>
<th>η\textsuperscript{2}</th>
</tr>
</thead>
<tbody>
<tr>
<td>VE</td>
<td>0.220</td>
<td>0.642</td>
<td>0.005</td>
</tr>
<tr>
<td>Day</td>
<td>0.742</td>
<td>0.394</td>
<td>0.017</td>
</tr>
<tr>
<td>VE*Day</td>
<td>0.004</td>
<td>0.952</td>
<td>0.000</td>
</tr>
</tbody>
</table>
there is a need to consider other methodological details which may impact upon the measured variables. For example, during repeated measurements of maximal hand grip force, standardisation of distance between handles [15] and daytime and warm-up [16] are required. Moreover, maximal HGS depends on the angle between the upper arm and forearm. Some authors believe that the most reliable measurements of the strength are obtained when the elbow is extended and forearm is oriented toward a ground [17], whilst others recommend that the forearm is flexed at 90 angles to the upper arm [18]. In our study, the subjects were tested using the elbow position recommended by Alkurdi ZD [18].

As shown in Table 1, neither VE nor testing day affected HGS. The lack of a performance change suggests that such an effort has insufficient sensitivity for detecting an external verbal stimulus, or that all subjects (being highly skilled) had high levels of intrinsic motivation such that additional external encouragement had rather debilitating instead facilitating effect. This assumption is supported by earlier quoted articles, which reported external stimuli may disturb maximal muscle contractions in elite athletes. Moreover, the time duration of each HGS trial was very short (less than a few seconds). In such a case, relative silent may provide a more suitable environment for maximal performance efforts. It is worth to note, that during weightlifting and track and field (throwing, jumping or sprint) competitions, contestants need to be silent just prior to performance. Conversely, during game sports, verbal feedback may come from spectators, family or friends, and/or loud rhythmic music, however, noisy conditions disturbance physical ability in female volleyball players [19].

During our investigation, mean HGS tended to increase slightly. On the second day of testing it was higher by 2.7% when compared to day one. As mentioned earlier, all of the judokas reported their intrinsic motivation to improve their previous results, and some of them were ready to perform more than 3 attempts to achieve a better score. One may speculate, whether slighted rise of HGS on the second day was due to neural adaptations or enhanced sympathetic nerve activity. These mechanisms, however, were documented only after longer training periods, which did not produce any changes in forearm muscle volume [19,20].

Summing up our study, we found no effect of VE (from a coach) on maximal isometric HGS in male judo players. Despite this, the level of HGS does play a crucial role in a judo struggle. Therefore, possible the effects of the other stimuli, for example visual feedback, on this parameter are warranted.

**Conclusion**

Male judo players did not show any improvements in HGS following exposure to VE from a coach.

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**References**


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