RUN TIME AND PERCEIVED PERFORMANCE INFLUENCED BY EXTERNAL FEEDBACK IN ENDURANCE ATHLETES

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ABSTRACT

Allison Jancik, Joua Vang, Laura Kiekhoefer, Sarah Lose. *Journal of Undergraduate Kinesiology Research* 2012; 8(1):9-15. **Purpose:** Research on the impact of frequency of encouragement for run training has never been explored. To give insight into coaching methods for practices and competitions, knowing how much to encourage athletes is important. The purpose of this study was to gain insight into which amount of encouragement provides the most influence on running performance during training sessions for endurance runners. **Methods:** Twenty-three participants (8 males, 15 females) aged 18-27 years (20.3 ± 1.8) performed three, two-mile run on an indoor track, separated by a rest period of at least one full day. The three conditions were: no verbal encouragement, minimal verbal encouragement (every 400 m), or maximal verbal encouragement (every 50 m). **Results:** Maximal encouragement resulted in faster run time (16.39 ± 2.0) than no encouragement (16.87 ± 2.4) (p < .05). Perceived performance (Subjective Exercise Experience Scale, Rating of Perceived Exertion, open-ended survey) was not significantly affected by the frequency of feedback given. Results for the minimal encouragement trial as compared to the other conditions were not significant. **Conclusion:** This study indicates that with higher frequencies of encouragement running performance may improve.

**Key Words:** Encouragement, Performance, Running , Motivation, Frequency.

INTRODUCTION

Training is a necessity for all sports in order to prepare for competition. Training can be performed under differing conditions to produce a multitude of results depending on what the desired outcome may be. Many factors can affect exercise performance during training such as athlete’s attitudes, coaches’ styles and attitudes, relative success and failures that season, teammate’s behavior,
weather, nutrition, and other psychological and physiological factors. A common feature of most sporting events is the use of encouragement by spectators, coaches, and players to motivate athletes. Encouragement may also be utilized to improve performance during training, specifically by coaches. Although encouragement is typically verbal, it can also be portrayed through body language, clapping, facial expression, and signage.

Many studies (1,2,10) have been conducted to investigate the effects of verbal encouragement on different types of exercise performance. Bullinger et al. (2) examined the effects of concurrent verbal encouragement vs. no verbal encouragement on females during a Wingate Anaerobic Cycle Test. When examined, there were no significant results in the data with no verbal encouragement. However, because Bullinger et al. only examined the effects of verbal encouragement on females, future studies in this area are encouraged to compare male and female data.

Moreover, O'Sullivan et al. (10) took into consideration visual encouragement and how it would influence measurements of isokinetic concentric muscle contractions. The results showed that the combination of verbal and visual encouragement resulted in an increase in overall peak torque. O'Sullivan et al. did not consider the effects of frequency of encouragement on muscle contractions.

Furthermore, Andreacci et al. (1) studied the use of verbal encouragement to motivate athletes who observed the effects of different frequencies that verbal encouragement had on maximal exercise testing. The participants received one of four frequencies of encouragement throughout a maximal exercise test at intervals of 20 seconds, 60 seconds, 180 seconds, or not at all. Measurements taken were relative VO₂ max, exercise time, blood lactate concentration, respiratory exchange ratio (RER) and ratings of perceived exertion (RPE). There was an improvement in maximal exercise performance for the encouragement issued every 20 seconds and 60 seconds and no improvement for the encouragement issued every 180 seconds and no encouragement group. Thus, there is a need for future research to identify if there is a trend associated with increasing frequency of verbal encouragement along with the effects on endurance-related activities.

Although encouragement has been studied in a variety of settings, very little research has been conducted discerning whether increasing frequency of encouragement elicit improved endurance performance and possible changes in perceived performance. Thus, the purpose of this study is to gain insight into which frequency of encouragement provides the most influence on running performance during training sessions for endurance runners. Furthermore, we hypothesize that increasing frequency of encouragement will elicit lower run times accompanied with a more positive perceived performance of the run.

**METHODS**

**Subjects**
The 23 participants (15 females, 8 males) were all healthy, endurance runners aged 20.3 ± 1.8 years (18-27) and currently involved in some type of endurance exercise program at least 3 days/week for at least one hour duration with a moderate to vigorous intensity. Exclusion criteria from the study included not complying to the protocol of taking a day of rest between trials and participants who were not endurance athletes. These exclusion criteria were put in place to keep the protocol consistent and to eliminate participants who were not at the fitness level to complete the trials.

All participants were recruited from the University of Wisconsin-Eau Claire via emails, presentations in classes, club meeting visits, and advertisements around the campus. Volunteers signed an
informed consent document before participating in the study, which was approved by the University of Wisconsin-Eau Claire Institutional Review Board.

**Procedures**

Testing procedures were conducted on the indoor track in the McPhee Center at the University of Wisconsin-Eau Claire. There were three experimental trials of a 2-mile run separated by one full day of rest, one involving no encouragement (TRIAL NO), one involving minimal encouragement every 400m (TRIAL MIN), and one consisting of encouragement every 50m (TRIAL MAX). Although a formal randomization was not utilized due to availability of researchers and participants, the order of trials was fairly evenly distributed and is considered a limitation of this study. Participants were not given information about the major independent variable (frequency of encouragement). Minimal information was provided for participants prior to and during the trials, stating simply that it was a training study. This precaution was needed to prevent subject bias during trials.

**Experimental Protocol**

For all trials, the participant wore a Polar Heart Rate Monitor (Polar Electro Inc., Lake Success, NY) and a watch on their wrist to monitor heart rate. Resting heart rate was taken while seated prior to running. The heart rate monitor watch display was covered by tape for the trial so as not to affect running pace. Researchers escorted the participant to the indoor 200m track, and instructed the participant to complete a 400m warm up by either walking or jogging.

After the warm up, the participant was instructed to complete 16 laps at their “normal training pace” and stay in the innermost lane. Having participants run at their training pace was to simulate an athlete training for an event, not actual competition. For each running lap, the researcher at the starting line announced what lap count was completed by saying “1 lap down”, “2 laps down”, etc. When the halfway point of eight laps was completed, a Borg CR 10 Rate of Perceived Exertion (RPE) Poster was shown to the subject who indicated RPE verbally or by holding up the corresponding number of fingers. Immediately at the completion of the 2 mile run, the elapsed time was recorded and exercise heart rate was taken. As a safety precaution, the participant then completed a 400m cool down either by walking or jogging to make sure their heart rate was recovering towards their resting levels. If heart rate was not going down after 400m, an additional 200m cool down lap was walked.

When recovered the subject completed the Subjective Exercise Experience Scale (SEES, 7) questionnaire, a reliable and valid psychological instrument. Specifically the questionnaire has three subscales that measure psychological well-being, psychological distress, and subjective fatigue. Each subscale is addressed through four questions asking the participant to identify whether they are feeling a certain emotion right after exercising. The items are answered by circling a number on a 1 (Not at all) to 7 (Very much so) Likert-type scale. To create a total score, the four questions on psychological well-being were given opposite values of 1 (Very Much) to 7 (Not at all), this change allowed for all subcategories of scores to be added together. The questionnaire produces a total score range of 12 to 84, with lower scores indicating a more positive experience and higher numbers being equated to a worse subjective experience. The inventory has shown discriminant and convergent validity, with internal consistency for reliability reported at .84 to .92 over three studies (#). With the SEES questionnaire, there were several open-ended questions about the trial (see Appendix A). The completion of the questionnaire finished the trial.
TRIAL NO (Control)
In this trial, the only communication with the subject during the run was the lap count. This information was given at the start/finish point of the 200m track.

TRIAL MIN (400m Encouragement)
For the 400m encouragement trial, the same researcher was present for all trials of that type. Verbal communication began when the subject was at a 10m distance before the researcher. The number of laps completed was announced followed by the encouragement, positive facial expression and body language, and half of the time with the participant’s name. Encouragement was given off of the script below.

| 1. Way to Go       |
| 2. Keep it Up      |
| 3. You're Doing    |
| Great              |
| 4. Nice Job        |
| 5. Woo Hoo         |
| 6. You Got This/It |
| 7. Looking Good    |
| 8. Way to Work     |

TRIAL MAX (50m Encouragement)
There were four researchers administering encouragement on the 200m track. They were spaced 50m apart (on the four corners of the track) in the same order for all trials. For example, the participant started with researcher A saying “You’re Doing Great”, then would proceed to researcher B saying “Looking Good”, researcher C would say “Woo Hoo”, and the researcher at the starting line would say “Way to Go”. The researcher at the starting line was the last to start encouragement because encouragement did not start until the participant completed the first 50m. Each researcher started at a different phrase on the above script to simulate more realistic conditions and phrases were not back to back. When verbal encouragement was given by each researcher it was presented in the same manner as TRIAL MIN. After each lap, the researcher at the starting line would announce the number of laps completed followed by the encouragement.

Statistical Analyses
The primary dependent variables included final exercise run time for the two miles and the SEES questionnaire responses total score. The independent variable was the frequency of encouragement. A Repeated Measure ANOVA was run to compare the time for the three conditions. Another Repeated Measure ANOVA was used to compare SEES total score with conditions. To further analyze the subsequent data, a correlation test was run between each of heart rate, RPE, Time and SEES for each condition. Statistical significance was set at $p < .05$. Statistical analyses were performed using SPSS software version 19.0 (SPSS Inc.).

RESULTS
The demographics of the participants are shown in Table 1.
Performance
Table 2 focuses on the mean running times for each trial. According to the Repeated Measure ANOVA, there was a significant difference in run times across the trials (F=4.94, P=.012). Planned comparisons revealed that running time was significantly faster in the TRIAL MAX (maximal encouragement) condition than the TRIAL NO (no encouragement) condition, p<.05. The difference between TRIAL MAX and TRIAL MIN (minimal encouragement) approached significance (p=.055). Figure 1 graphically shows this improvement in run time with an increased frequency of encouragement. Twelve of the 23 subjects increased their average speed during TRIAL MAX compared to the other two conditions.

Perceived Performance
Overall, the SEES scores for the participants ranged from 14-57 (see Table 2). For the three conditions, the means indicate that participants did not have a significantly more positive exercise experience during any trial when compared to the others (F=.67, P=.52). Although not significant, Table 2 shows a slight tendency towards improvement (reduction) in SEES scores as frequency of encouragement increased. TRIAL MAX produced higher SEES scores than the other two conditions (6 out of 23 participants).

Based off of the open-ended questions, fewer participants in the TRIAL MAX condition mentioned not enjoying their experience (13%), compared to 30% of the participants in the TRIAL MIN and TRIAL NO conditions. When asked to describe their performance, subjects indicated experiencing more negative thoughts (48%) in the TRIAL NO condition than during the other two runs (30%, 30%). Negative comments made about any of the three conditions were not related to the feedback or lack thereof, rather were centered on their perceived running performance. According to the participants, the most common variables that could have improved their run were running outdoors, the track being cooler, having music, and having a running partner. Nine out of the 23 participants specifically mentioned the encouragement from the facilitators as helpful during TRIAL MAX.

The Correlational analyses showed no significant relationship between heart rate, RPE, run time, & SEES scores in any of the trials.

Table 1. Participant Demographics

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yrs)</td>
<td>20.3</td>
<td>1.8</td>
<td>18-27</td>
</tr>
<tr>
<td>Weekly Running Mileage (miles/wk)</td>
<td>11.4</td>
<td>5.7</td>
<td>1-22.5</td>
</tr>
<tr>
<td>Pace (min/mile)</td>
<td>8:20</td>
<td>5:30-10:00</td>
<td></td>
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</table>

Table 2. Means and Standard Deviations

<table>
<thead>
<tr>
<th></th>
<th>N=23 TRIAL NO</th>
<th>N=23 TRIAL MIN</th>
<th>N=23 TRIAL MAX</th>
<th>F(2,44)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Run Time</td>
<td>16.87*(±2.4)</td>
<td>16.77 (±2.1)</td>
<td>16.39*(±2.0)</td>
<td>4.94</td>
<td>.012</td>
</tr>
<tr>
<td>SEES Score</td>
<td>28.5 (±8.8)</td>
<td>28.3 (±10.6)</td>
<td>26.8 (±7.8)</td>
<td>.67</td>
<td>.52</td>
</tr>
</tbody>
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DISCUSSION

Encouragement has been researched in the past to study its effects on different forms of exercise, however to our knowledge, varying the frequency of encouragement during endurance training has not yet been studied. The purpose of our study was to gain understanding and explore the frequency of encouragement that provides the most influence on running performance and perceived performance by the participant. Supporting previous research on different frequencies of encouragement (1,2,10), our study found that run time improved with increasing frequency of encouragement. Andreacci et al. (1) investigated maximal exercise testing performance changes with increasing frequency of encouragement. Their results indicated that encouragement issued every 20 seconds and 60 seconds improved performance versus 180 seconds and no encouragement. In agreement with Andreacci et al. (1), the present study found TRIAL MAX had the fastest run times compared to TRIAL MIN and TRIAL NO, but was only considered significant between TRIAL MAX and TRIAL NO p<.05. Though the difference between TRIAL MIN and TRIAL NO were not considered significant, they were still approaching significance with p=.055. From these findings, the present study suggests a trend towards increased encouragement improving performance for endurance runners.

Apart from performance, perceived performance can be equally as important to an endurance runner. Besides our results suggest a trend toward greater reductions in SEES scores with increased encouragement, indicating encouragements may improve mood during training. When analyzing the open-ended questions of the survey, many of the factors affecting the participants’ perceived performance were beyond the encouragement, such as temperature, music, indoors/outdoors, traffic, and having a partner. Also from this survey, nine of 23 subjects mentioned that more encouragement influences a more desirable environment for run training.

Limitations
We acknowledge that there are some limitations in our experiment. The participants were not randomly assigned to the conditions, which resulted in accidental sampling where participants were chosen based on their relative ease of access. In addition, environment in which these trials were performed in was not completely controlled (e.g., temperature, noise, traffic, etc.). A smaller sample size may have contributed to not detecting a significant difference in one run time comparison.

CONCLUSIONS
Encouragement may be utilized to improve performance during training. Increase in frequency of motivation can improve exercise performance. Future studies might include a greater variety of frequencies of motivation, different methods of study (running distance, different sports and physical activities, questionnaires), increase sample size, and different populations. Applications of these findings include coaching styles for training, continued motivation for the athlete to participate in the sport (12). If an athlete has a positive training experience, this will then likely correlate to their performance during a competition (4).

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REFERENCES


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