THE EFFECTS OF QUANTITATIVE FEEDBACK ON THE REDUCTION OF LANDING FORCE

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INTRODUCTION

Many sports involve regularly landing from a jump. Repetitive, high force landings have been associated with an increase in lower extremity injuries in active individuals [1]. Recently, the use of feedback has been implemented to aid athletes in reducing their landing forces. However, the feedback has generally been qualitative in nature [2]. This study aimed to evaluate the usefulness of providing quantitative feedback regarding landing force and landing sound.

METHODS

Forty recreationally active males and females were assigned to one of four feedback groups. Each group was comprised of five males and five females. The groups were given feedback about peak force only (Force), feedback about peak sound only (Sound), feedback about both peak force and peak sound (Both), or feedback about neither peak force nor peak sound (Control).

All subjects performed a series of drop landings from a set height onto a force platform, and vertical ground reaction force (GRF) and sound level were recorded for each landing. Subjects performed three trials without feedback, establishing baseline force and sound values. The appropriate feedback was given after each of the next five landings. The feedback was presented on a 1 to 10 scale, with 10 representing 100% of the baseline value. All subjects returned one week later to perform three landings without feedback. The effects of feedback on peak vertical GRF were computed using a 2 (peak sound level) × 2 (peak force) repeated measures ANOVA.

RESULTS AND DISCUSSION

The main effect for time on peak force was significant, $p<.01$. Pairwise comparisons for peak force indicated that subjects significantly changed their landing forces from the baseline measures to the feedback measures, $p<.01$, and the baseline measures were significantly different from the retention measures, $p<.01$ (Figure 1).

Overall, the feedback groups reduced their peak force by 0.80-1.39 times body weight (BW). However, the main effect for feedback group and the interaction effect between feedback group and time were not significant, $p>.01$. Since the main effect for group was non-significant, the differences between the feedback groups over time were examined by looking at the effect sizes between the four feedback groups. The effect size for the difference between the baseline and feedback measures was moderate to large when the each group was compared to the Control group, -1.16, -0.82, and -0.69 for Force, Sound, and Both groups respectively. (An effect size ≤ 0.2 was considered small. An effect size of approximately 0.5 was moderate and ≥ 0.8 was large. [3]). Similar effect sizes occurred for the difference between baseline and retention measures when the Control group was compared to the Force, Sound and Both groups, -1.17, -0.65, and -0.66 respectively. The effect sizes between the Force and Sound group were 0.21 from baseline to feedback and 0.52 from baseline to retention, while the effect sizes between the Force and Both groups were 0.29 and 0.41 for the same difference scores.

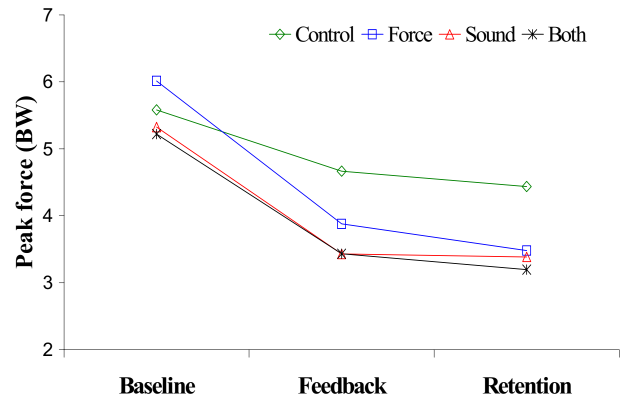

Figure 1: Changes in peak force over time for different feedback groups.

CONCLUSIONS

All subjects decreased their landing force over the course of the study due to learning. The reduction in force was greater for the feedback groups, though not significantly greater. However, effect sizes indicated a trend towards any type of feedback being better than no feedback at all. An increased number of subjects per group might have solidified this trend. Feedback on peak force was the most effective feedback, as the feedback group had the largest effect sizes between both baseline and feedback and baseline and retention when compared to the other groups. Feedback on sound level was also effective, raising interesting questions about the potential for a more accessible method of providing feedback on landings. Sound has previously been shown to be a significant predictor of force, allowing for inferences of relative force to be made from relative sound [4].

REFERENCES

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