Effects of slackline training on dynamic postural balancing

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The purpose of the present study is to reveal the effects of slackline training on dynamic postural balancing. A slackline is a flat belt made from nylon or polyester, tightly spanned between two anchor points. As it bounces and swings in all directions, keeping balanced on it is difficult. Slacklining, thus, requires one to dynamically and flexibly modulate whole-body coordination. Since slacklining is expected to improve postural balance, it is widely used in balance training for not only top-level athletes but also for the rehabilitation of the elderly or those with motor disorders.

Stabilizing one's own body and orienting to dynamic environment is an essential physical ability for human skill acquisition/development/improvement. The ability to adapt to unpredictable noise or perturbations – dynamic embodied adaptability – is related to high sensitivity to changes in the environment and in one's own body, as well as to rapid, flexible organization of the embodied system (i.e., synergy). This ability also involves human embodied skills and is an important research topic in Skill Science.

However no previous studies have investigated the effect of slackline training in terms of dynamic embodied adaptability. A few studies have evaluated postural stability in terms of static measurements based on trajectory length or velocity of the center of pressure (COP). However, because such static measurements of postural stability define less movement of the COP as indicating more stability, they are inappropriate for evaluating human postural fluctuation and dynamic embodied adaptability, which is non-linear and non-stationary.

The present study aims to reveal the types of balance ability improved by the slackline training, as well as how such training causes improvement. To do so, we will consider not only static measurements but also dynamic measurements, calculated by nonlinear time series analyses. In the present experiment, healthy young participants will be randomly assigned to two groups: training and control group. The former will be required to participate in the 20 minutes slackline training, while the latter group will be asked to relax and hold still for 20 minutes. The balancing abilities of each participant will be evaluated before and after the 20 minutes session. Results of static and dynamic measurements of two groups will be compared.

The preliminary experiment is in progress. A few sample data have been obtained, and their COP time series are being analyzed. In the current workshop,

we will present the experimental method, and some of analyzed data will be reported.