was used to capture the whole body movements during performing push-hand with 31 retro-reflective markers placed on selected anatomic landmarks on the head, trunk, upper and lower extremities. A surface EMG system was synchronized for muscle activities detection of eight muscles of lower extremities.

The results showed that the four events occurred at 12%, 29%, 22% and 37% of push-hand cycle, respectively. Three dimensional range of motion of the upper and lower limb joints were measured. The major sagittal plane motions were 5.7°±16.7° to 38.9°±17.5° degrees of hip flexion, 20.9°±18.4° to 65.5°±9.5° degrees of the knee flexion, and 0.01°±15.6° to 16.1°±13.1° degrees of the ankle dorsiflexion. The rectus femoris muscles of both legs performed eccentric contraction and contracted when the center of mass moved toward the fore leg. It was found that different TCC trainings might result in different levels of hamstring muscles relaxation. For competition, TCC learners were instructed to distribute more than half of their weight on the fore leg and the muscles of the rear leg were not completely relaxed. In conclusion, this study helps us understand the interaction between muscle activities and posture control in Tai Chi push-hand movement. The outcome may be used for stability training program design in older persons.

Conclusions: Significant difference of throw-in movements found between the ordinary players and good football players. So they should emphasize the control of release angle, flexibility and the sequence in which each link imposes force during their throw-in training.

6098 Evaluation of soccer-specific field tests
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Introduction: The sport-specific field tests are generally popular due to their simplicity, reduced cost, and a minimal use of equipment. Nevertheless, even within the most popular sport games such as soccer, the tests applied are seldom evaluated. Specifically, although most of them could have a property of face validity, their reliability often remains unknown. The aim of the present study was to assess the reliability of selected soccer specific field tests.

Methods: Twenty professional male soccer players from the teams belonging to the I national division participated in the study. The evaluated tests were: standing ball kick, throwing-in, 10m, 20m and 30m sprint, 10m running, and the zig-zag running performed with and without the ball. Following the instructions and demonstration, the subjects performed one practice and three consecutive experimental trials of each particular test. One-way analysis of variance (ANOVA) with repeated measures and Tukey post-hoc revealed no systematic bias between consecutive trials of the evaluated tests.

Results: The ratio between the limits of agreement and the recorded values revealed the highest relative intra-individual variability in the throwing-in and zig-zag running without ball (2.8% and 2.4%, respectively) and the lowest in 20m and 30m running (about 0.6%). However, all tests revealed intraclass correlation coefficients ICC >0.80 suggesting high reliability except the standing kick that revealed moderate reliability (i.e. ICC =0.76).

Conclusion: Therefore, we conclude that all evaluated tests could be recommended for field testing of elite soccer players.

6092 Biomechanical research on one circle somersault connection techniques of trampoline
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Introduction: One circle somersault movements are the fundamental performances of trampoline. Connection techniques are the key points of complete performance’s segment. This research aims to gain the general kinematics characteristics by analyzing connection techniques of one circle somersault.

Methods: We study the similarities and differences of different direction of somersault, the posture of form and twist of one circle somersault and kinematical character of the same movement connects different one circle somersault movements. Using two high-speed JVC by 100 f/s to shoot one circle somersault movements of six trampoline sportmen in settle the machine flat surface. No. 1 camera shoots the aerial phase, located at 17 m from trampoline net, the height of camera is 4.6 m. Another shoots the touching net phase, laid at the opposite of No. 1 camera, the distance is 4.7 m, and the height is 0.9 m. Relations: (1) In leaving net phase, the hip and ankle angles are larger in front somersault than in back somersault, but the knee angle is smaller. (2) There are different from double somersault that the dropping net angle and leaving net angle are smaller in front somersault than in back somersault. (3) Kinematical characteristics are not different in connecting picked and tucked front somersault, the leaving net angle in straight front somersault is larger than in picked and tucked front somersault; the leaving net angle increase with the twist degree in connecting back somersaults, but the leaving net angle decrease with the twist in connecting front somersaults. (4) In dropping net phase, knee first diminished or kept certain angle then straight. In leaving net phase, knee changed with the direction of connecting, it increases gradually in front somersault and decreases in back somersault. (5) The net and foot accelerate curve in touching net phase shows that the rate of elastic force change is larger in dropping net phase than in leaving net phase.

Conclusions: one circle somersault connection techniques of Trampoline depends on coordination between the human performance and net deformation.