請閱讀該文獻內容並回答問題。(摘錄自 J Geriatr Phys Ther. 2012; 35(1): 8-14)

1. 請為此摘要下一個英文與中文標題。(10%)

2. 請將此摘要翻譯成中文。(20%)

3. 請問下圖中 A 與 B 各代表 force control 中何項區段，並以中文簡述其代表含意。(10%)

Abstract

Older adults often experience age-related declines in strength, which contribute to fall risk. Such age-related levels of fall risk may be compounded by further declines in strength caused by acute muscle fatigue. Both age- and fatigue-related strength reductions likely impact the ability to quickly develop joint torques needed to arrest falls. Therefore, the purpose of this study was to investigate the combined effects of age and localized muscle fatigue on lower extremity joint torque development. Young and older healthy male adults performed an isometric ankle plantar flexion force control task before and after an ankle plantar flexor fatiguing exercise. Force control performance was quantified using onset time, settling time, and rate of torque development. Age-related increases and decreases were observed for onset time and rate of torque development, respectively. A fatigue-related decrease in rate of torque development was observed in young, but not older adults. The results suggest performance declines that may relate to older adults' reduced ability to prevent falls. A fatigue-related performance decline was observed among young adults, but not older, suggesting the presence of age-related factors such as motor unit remodeling and alterations in perceived exertion. Older adults demonstrated an overall reduction in the ability to quickly produce ankle torque, which may have implications for balance recovery and fall risk among older adults.

Procedure

Force control tests were done with the ankle positioned in 10° of plantar flexion. The participant was instructed to respond to an auditory stimulus by producing ankle plantar flexion torque equal to 40% of the isometric MVC as quickly as possible and then holding the target level as steady as possible. Force control data set was divided into transient and steady state regions. The transient region was defined as the time period beginning with torque onset and ending with torque settling time (defined later). The steady state region was defined as the 5-second period following torque settling time, during which the participant maintained the target torque level. Variables calculated during the transient region included onset time, settling time, and rate of torque development. Onset time (t_{onset}) was defined as the time at which the torque increased to 3 standard deviations more than the baseline level. Settling time (t_{settle}) was defined as the first point in a 1-second window of data in which the torque remained within ±5% of the target value (40% isometric strength capacity). Rate of torque development was defined as the slope of a least squares line fit to the linear portion of the transient region, defined as the duration between onset and the time at which the torque had reached its root-mean-square value (or 70.7% of the target level).

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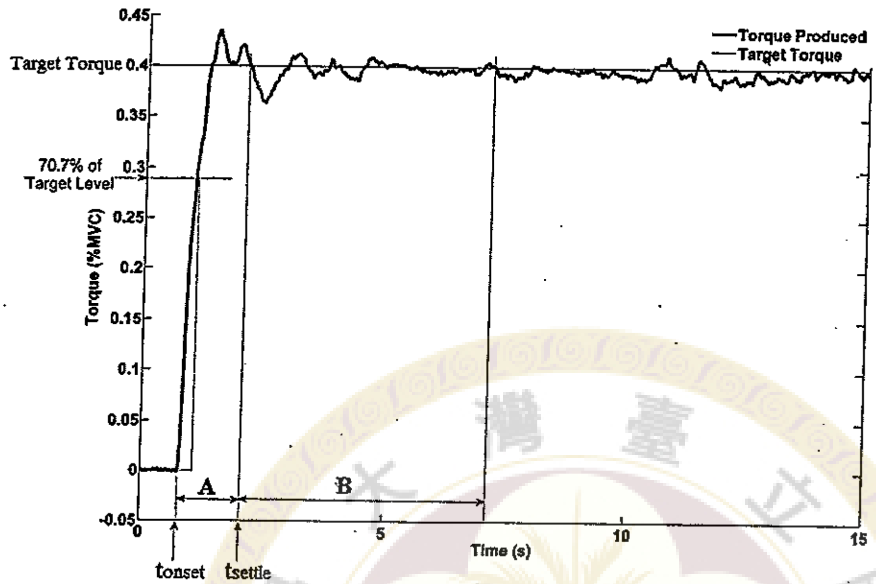

Figure 1. Target and actual ankle plantar flexion torque during force control task, normalized to isometric strength capacity, for a representative subject.

請閱讀該文獻內容並以中文回答問題。(摘錄自 Gait Posture. 2010; 32:572-5.)

4. 請問何謂 internal focus 與 external focus？(20%) 並請各舉一例說明。(10%)

5. 請問此研究之動機與目的各為何？(15%)

With the proportion of older adults increasing in many industrialized nations, much research is being dedicated to understanding the changes that occur with aging. One area of decline seen in older people is the performance and learning of motor skills, including those requiring balance. Loss of postural stability is a primary risk factor for falls. Although most falls do not result in serious injuries, they will at least affect the individual's feelings of competence and quality of life. This illustrates the need for developing exercise or training strategies that can enhance balance in older people, and perhaps reduce their risk of falls.

One factor that has consistently been shown to enhance the performance and learning of motor skills, including balance skills, is the performer's focus of attention. Specifically, instructions or feedback that induce an external attentional focus – directing attention to the movement effects on the environment (e.g., support surface, implement) – have been found to result in more effective motor performance than those inducing an internal focus by directing attention to the body movements themselves, or no focus instructions. This has also been shown for a variety of balance tasks. For example, in studies in which participants were asked to learn to balance on a platform that tilts to the left and right (stabilometer), instructing them to concentrate on keeping markers attached to the platform horizontal (external focus) resulted in more effective learning than instructing them to concentrate on keeping their feet horizontal (internal focus). Importantly, external focus benefits have not only been shown relative to internal focus conditions, but also relative to control conditions. This suggests that, left to their own devices, individuals tend to adopt less-than-optimal (possibly, internal) foci. A focus on the intended movement effect facilitates the utilization of unconscious or automatic processes, resulting in greater movement ease or fluidity. Conversely, focusing on one's own movements leads to a more conscious type of control, thereby constraining the motor system and disrupting automatic control processes. It has been shown that relative to an internal focus, an external focus reduces attentional demands and results in the utilization of fast reflexive (automatic) feedback loops.

Most studies have examined attentional focus effects in young, healthy adults. Given the apparent generalizability of the attentional focus effect across tasks and skill levels, we deemed it potentially fruitful and important to examine whether motor skill learning in older adults would also benefit from instructions inducing an external focus – particularly in light of balance issues facing many older people. To date, only a few studies examining attentional focus effects have used older adults (with Parkinson's disease or after stroke) as participants. The results of those studies were in line with previous findings.

Nevertheless, it seemed important to further examine the generalizability of the benefits of an external focus to older adults without physical or mental impairments. Moreover, a limitation of previous studies with older (impaired) participants was that they examined only immediate effects of attentional focus on motor performance. That is, evidence that focus instructions have a more permanent effect on motor learning in older adults – as measured by delayed retention tests without instructions or reminders – is still lacking. The question whether older people would show differential learning as a function of instructions to focus externally rather than internally is not trivial. The learning of new (motor) skills is generally assumed to be "slower", that is, to require more practice time in older compared to young adults. As a consequence, a state of automaticity in movement control is reached later. This slowing of learning has been attributed to various factors, including limitations in information processing, prolonged reaction and movement times, as well as the adoption of more conservative response strategies where accuracy is emphasized over speed.

Given the effectiveness and simplicity of directing learner's attention to the movement effect, the purpose of the present study was to determine whether older adults would show more effective learning after being provided external rather than internal focus instructions.

請閱讀該文獻內容並以中文回答問題。(摘錄自 J Strength Cond Res. 2010; 24:3032-40.)

6. 請由下表中提供的訊息，整理該文獻之研究結果。(15%)

The purpose of this study was to investigate the effects of Swiss-ball core muscle training on abdominal, lower back and leg endurance, flexibility and dynamic balance in sedentary women. The exercise protocol included straight arm crunch, alternate arm and leg extension, wall squat, shoulder bridge, back extension, hamstring curl, and leg raise.

The trunk extensor (lower back) muscular endurance was assessed by the number of back extensions completed without rest using modified Sorensen test. The trunk of the subjects was positioned horizontally unsupported from the upper border of the iliac crest while prone on an examination table. During the test, the buttocks and legs were fixed to the table by 3 wide straps, and the hands were placed at the side of head. The subjects were instructed to perform back extensions within a range of 45° while maintaining the natural lordic curve. The examiner gave instructional and verbal cues during the test. The number of repetitions was recorded when subjects could no longer remain horizontal. Trunk flexor (abdominal) muscular endurance was assessed by the curl-up test. The arms were placed at the sides, palms facing down with the middle fingers touching a

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piece of masking tape. A second piece of masking tape was placed 12 cm apart. Feet were flat on the ground with knees bent at 90°. Shoes were worn during the test. A metronome was set to 50 b•min^{-1}, and the subjects did slow, controlled curl-ups to lift the shoulder blades off the mat in time with the metronome. The subjects performed as many curl-ups as possible without pausing by touching their fingertips to both pieces of the masking tape.

Trunk extensor (lower back) flexibility was measured by the sit and reach test. A box was vertically marked in centimeters on top and had a movable yardstick at the 0-cm edge. The subjects removed their shoes before the test. The subjects sat on the floor keeping their legs straight with the soles of their feet touching the box. They put their finger tips on the 0-cm edge of the box and pushed the yardstick as far as they could while maintaining the position of their legs. The best score of 3 trials was recorded in centimeters.

Lower limb endurance was measured by repetitive squat test. The subjects stood with feet shoulder width apart. They were instructed to squat until their thighs were horizontal to the ground and then return to the upright position with knees slightly bent. A metronome was set to 60 b•min^{-1} to maintain the repetition pace of the squat. The upward (concentric) portion of the squat was 1 second, and the downward (eccentric) portion of the squat was 1 second. The number of repetitions that the subjects could perform in the proper form was recorded.

Functional reach test was used to measure dynamic balance. The subjects stood next to a wall with a comfortable stance width. They were then required to make a fist with their preferred arm and to reach as far as possible while keeping the arm parallel to the ground. The distance that subjects could reach forward holding their arm parallel to the ground was measured in centimeters. The subjects performed 1 practice trial and 2 tests. The mean score of the test measurements was recorded.

Table 1. Trunk and lower limb endurance, lower back flexibility, and dynamic balance

	Pre	Post	*p*
TFE (rep)	17.57 ± 5.41	30.95 ± 9.44	0.00
TEE (rep)	18.76 ± 4.48	27.38 ± 7.90	0.00
LLE (rep)	32.38 ± 6.91	42.85 ± 9.22	0.00
LBF (cm)	23.66 ± 4.20	25.57 ± 4.07	0.00
DB (cm)	32.52 ± 3.54	35.09 ± 3.49	0.001

- TFE = trunk flexor (lower back) endurance; TEE = trunk extensor (abdominal) endurance; LLE = lower limb endurance; LBF = lower back flexibility; DB = dynamic balance; rep = number of repetitions.
- Data are presented as mean ± SD ($p \leq 0.05$).

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