

Introduction

- Sit-to-Stand (STS) task is an essential activity of independent daily living. ¹ It is commonly transferred into the clinic as five-times STS task (FTSTS) to assess balance and muscle efficiency in the lower extremities and to determine outcomes with treatment. ¹
- The STS movement can be broken down into phases ^{2,3,4,5} yet, to our knowledge, it is unknown how body mechanics may change with greater repetitions occurring as part of the FTSTS.
- Research has shown that for actions such as the STS task, a certain level of attentional demand is required to perform the multiple components that are involved in completing a transitional movement. ⁶

Purpose

To determine the effects of dual tasking and multiple repetitions on the FTSTS task in healthy, young adults.

Methods

- **Participants:** 10 healthy adults (4 males, 6 females, 8 White, 1 Black, 1 Bi-racial) Mean Age: 24 ± 4.1 years; Height: 1.7 ± 0.14 m; Mass: 78.8 ± 26.1 kg
- **Procedure:** The participants were instructed to stand up and sit down five times as fast as possible. Their feet were positioned on force plates and knees were bent to a comfortable position. The FTSTS was completed for 3 trials without a cognitive task (Single Task STS) and then 3 trials with the cognitive task of counting backwards by 3 (Dual Task STS). ⁷
- **Kinematics:** Time to complete FTSTS task for each trial
- **Kinetics:** Ground reaction forces (GRF) produced during FTSTS task for each trial normalized to body weight
- **Statistical analysis:** 2-way ANOVA and paired samples t-test



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Results

Condition	Mean (SD) Time (s)	P
Single Task STS	7.38 (1.08)	0.0498
Dual Task STS	8.16 (1.77)	

Table 1: Average time to complete the FTSTS task was significantly greater with a concurrent cognitive task.

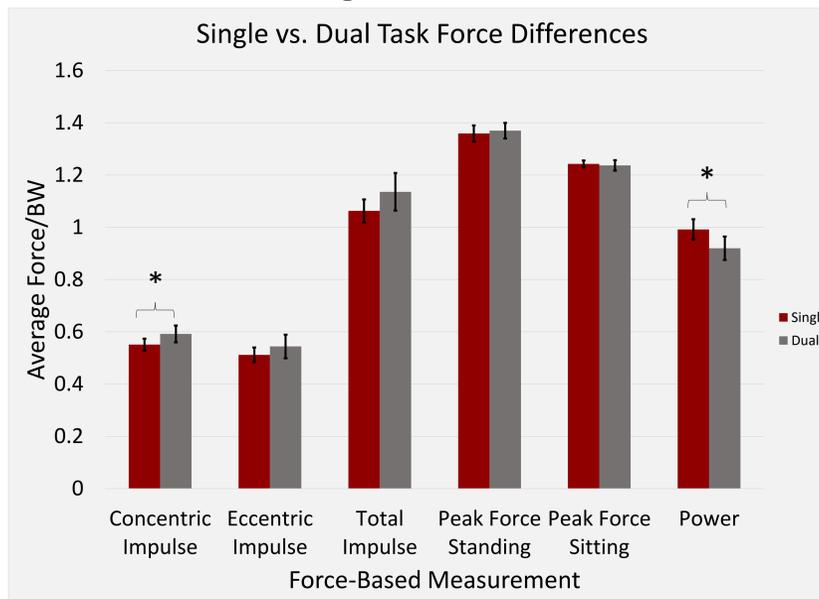


Figure 1: Significantly greater concentric impulse and lesser power were produced with concurrent cognitive task. (*P<0.05)

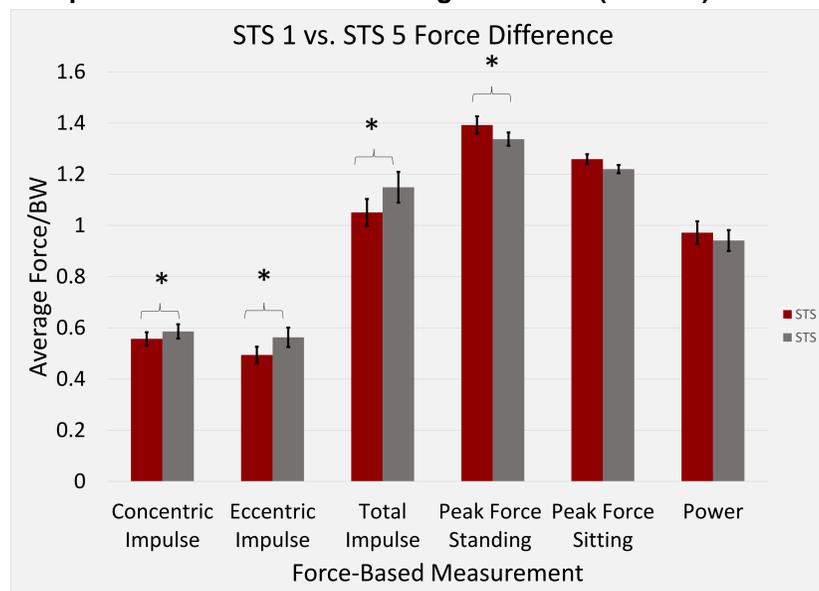


Figure 2: Significantly greater concentric, eccentric, and total impulse and lesser peak force standing occurred during the 5th repetition of the FTSTS. (*P<0.05)

Results cont.

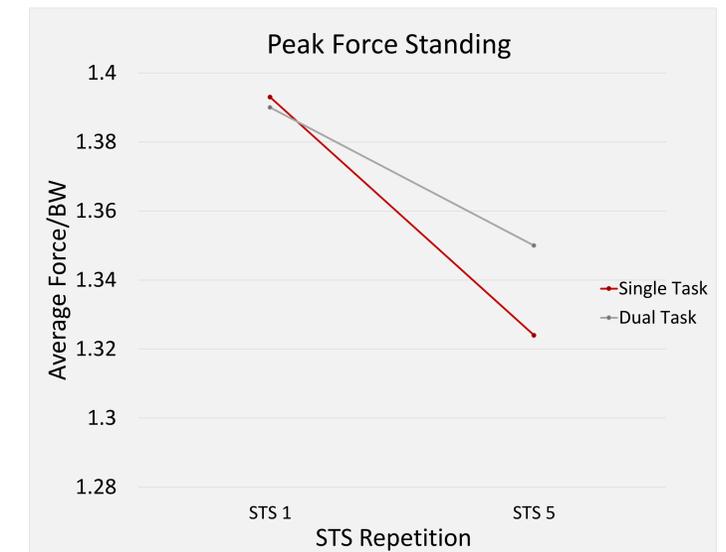


Figure 3: With increased repetitions of the FTSTS task, greater decreases in the peak force produced occurred during single task compared to dual task.

Discussion

- FTSTS time was significantly larger and power was significantly lower when completing a dual task. Performance can be blunted when multi-tasking because cognition plays a role in physical movement. ⁸
- Throughout the FTSTS task, impulse increased, suggesting that endurance may alter force production over time during this assessment. Chorin et al. observed a similar pattern between elderly fallers vs. non-fallers in which the faller group had a higher impulse. ²

Conclusion

The force characteristics are altered by both dual tasking and number of repetitions during the FTSTS task in healthy young adults. Implications for other populations need to be examined in conjunction with joint kinematics and muscle activation patterns.