

ABSTRACT

Purpose: Many adults with young children have difficulty finding time to exercise. Stroller running (SR) is a popular solution. Some research has explored the effects that SR has on run cadence, stride length and energy. To our knowledge, no studies have explored the effects of SR on the impact forces and shock attenuation on the major joints of the lower limb. Increased impact peaks and lessened shock attenuation have been linked to lower limb injuries in runners. The purpose of this study is to explore impact forces and shock attenuation differences in SR compared to regular running.

Methods: 13 participants (Height: 1.8m ± 0.08m Weight: 82.6kg ± 11 kg) were asked to run behind a Thule Urban Glide 2 (Thule Group, Inc, Malmö, SE) jogging stroller suspended over an instrumented treadmill (Bertec, Inc, Columbus, OH). The study involved four different running conditions: BH both hands on the handlebar, RH the right arm swinging with the left hand on the handlebar and left arm swinging, LH left hand swinging and NS without the stroller. Biomechanical data was collected with Vicon Nexus 2.3 (Vicon, Inc., Oxford, UK) and processed through Visual 3D (5.0, C-Motion, Inc., Germantown, MD, USA). Differences in ground reaction force and loading variables were compared between the four different conditions.

Results: The impact peak of the vertical ground reaction force, occurring immediately after foot strike, was reduced in the BH condition (1107 N) compared to both the RH condition (1263 N, p=0.017) and the NS condition (1276 N, p=0.04). There were no differences observed between conditions for the overall peak vertical ground reaction force or the loading rates of the vertical ground reaction force.

Discussion: Running injuries on the lower extremity generally occur from recurring force impacting it's joints. Immediately after foot strike the BH condition lessened the impact peak vertical ground reaction force, this could result in a reduced risk of injury. However, there was no change in overall impact force or loading rates, regardless of condition we tested. There is no evidence to suggest that RH or LH appear to increase nor prevent risk of potential injury. While this study is one of the first to quantify force and loading rates during SR, future studies should consider how the propulsion of the stroller would compare to the current findings.

INTRODUCTION

- Parents with young children often complain of lack of time to exercise. Running with a jogging stroller has become a popular solution.
- Previous studies have shown that stroller running decreases stride length and increases stride frequency.
- Increased impact peaks and lessened shock attenuation have been linked to lower limb injuries in runners.
- The purpose of this study is to examine how the altered gait from SR affects impact forces and shock attenuation compared to conventional running,

- 13 subjects (weight 82.6kg ± 11 kg, height 1.8m ± 0.08m) were asked to run behind a jogging stroller suspended over an instrumented treadmill for 4 trials, each lasting 4 minutes at a self selected speed.

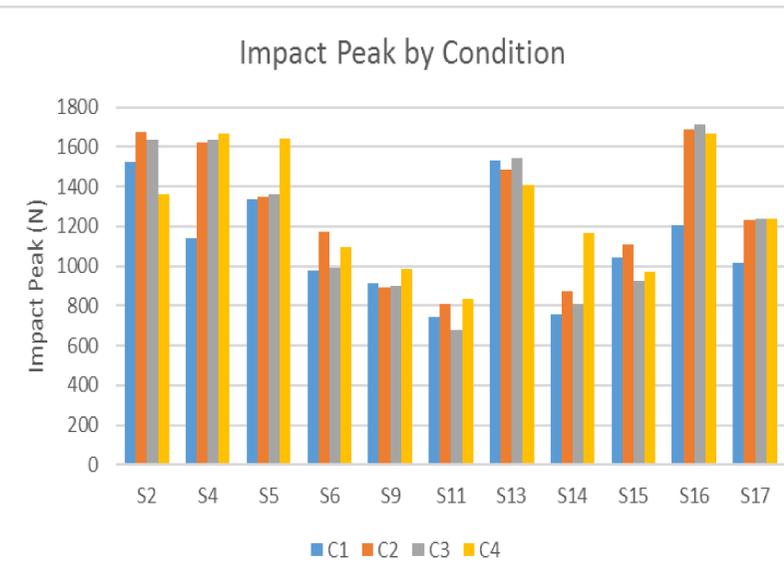
- The four running conditions consisted of both hands on the stroller (BH) then with the right (RH) and left arm (LH) swinging. Finally they ran on the treadmill without the stroller (NS).

- Biomechanical data was collected with Vicon Nexus 2.3 and processed through Visual 3D.

- Differences in ground reaction force and loading variables were compared between the four conditions



METHODS



Impact Peak

C1 < C2 and C4

Peak Vertical Ground Reaction Force

No Difference

Vertical Average Loading Rate

No Difference

Time to Impact

No Difference

DISCUSSION

- Running injuries often occur due to recurring impact forces on the joints of the inferior limb.
- Immediately after foot strike, the BH condition lessened the impact peak of the vertical ground reaction force, potentially decreasing the risk for injuries associated with this type of loading.
- No evidence to suggest that running with one hand on the stroller alters the ground reaction forces and loading variables compared to traditional running.
- Although this is the first study to quantify impact force and loading rate, our results could be limited because the subjects were asked to run while the stroller remained stationary.
- Future studies should compare these results with a study involving the propulsion of the jogging stroller.