## Abstract

## Methods

Subject characteristics are reported in Table 1. Subjects reported to the lab on two separate occasions.

Session 1:
Height, weight, leg length, biiliac breadth, bimalleolar breadth and flexibility were measured.
Body composition was measured by air displacement plethysmography (Bod Pod).

- Maximum oxygen consumption $\left(\mathrm{VO}_{2 \text { max }}\right)$ was measured shod using a continuous ramp protocol where treadmill grade was increased $2 \%$ every two minute stage.


## Session 2:

Weight was recorded shod

- Markers were placed on the right shoulder, hip, knee, ankle and foot.
- Subjects ran shod at $2.68,3.13$, and $3.58 \mathrm{~m} / \mathrm{s}$ at $0 \%$ grade with each stage lasting three minutes.
- Subjects then removed their shoes and were weighed again.
- Subjects ran barefoot at $2.68,3.13$, and $3.58 \mathrm{~m} / \mathrm{s}$ at $0 \%$ grade with each stage lasting three minutes.
- High speed ( 240 fps ) video was recorded for the last 15 seconds of each three minute stage.


## Video Analysis

- Video was uploaded to Dartfish Video Analysis Software for kinematic analysis.
- Ankle, knee, and hip angles were tracked throughout run.
- Stride frequency was calculated from video data.

Results
Table 1 - Subject Characteristics (mean $\pm$ std)

| Height $(\mathrm{cm})$ | $170.55 \pm 6.51$ |
| :---: | :---: |
| Mass $(\mathrm{kg})$ | $66.85 \pm 10.88$ |
| Body Fat \% | $17.53 \pm 6.61$ |
| $\mathrm{VO}_{2}$ Max $(\mathrm{ml} / \mathrm{kg} / \mathrm{min})$ | $49.23 \pm 4.91$ |
| Ankle Width $(\mathrm{cm})$ | $6.67 \pm 0.52$ |
| Hip Width $(\mathrm{cm})$ | $26.11 \pm 0.97$ |
| Flexibility $(\mathrm{cm})$ | $32.83 \pm 7.67$ |
| Leg Length $(\mathrm{cm})$ | $86.9 \pm 21.37$ |

Figure 1 - results of submaximal oxygen consumption test. Barefoot unning
becomes more economicical than shod running as velocity increases.


Figure 3 - results from high speed video analysis. Knee angle decreases with speed.
When running barefoot, runner's ssed freater knee flexion.

Conclusions

In the barefoot condition, stride frequency was increased and knee angle was decreased compared to the shod condition. Novice barefoot runners change gait kinematics in order to decrease ground reaction forces with little effect on economy. The only variable that had a significant correlation with running economy was body composition.

