

Step Activity Monitoring to Assess Functional Outcomes in EOS “Graduates”



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BACKGROUND

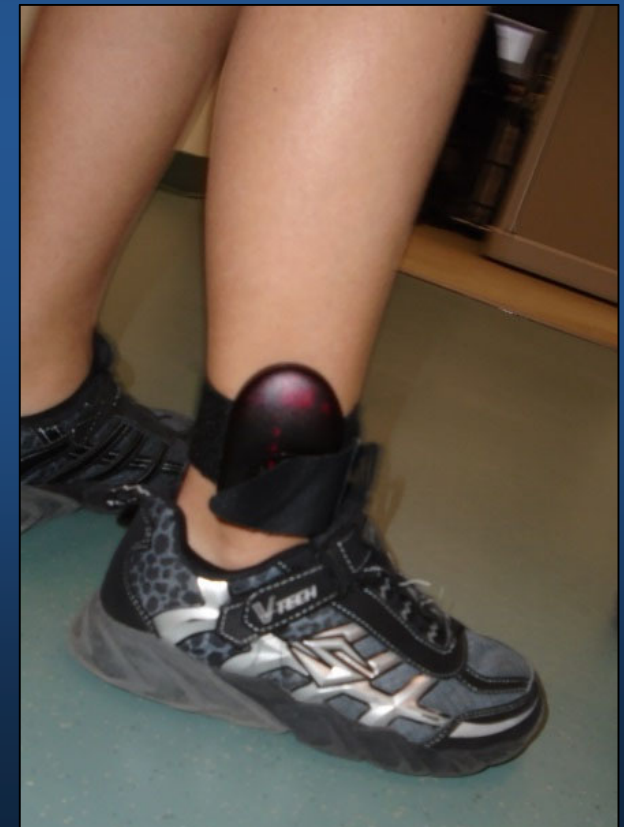
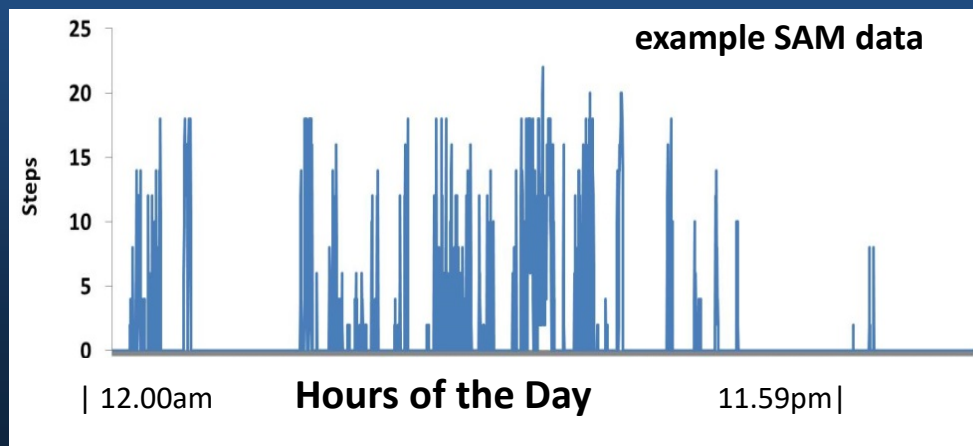
- Growing rod treatment designed to delay spinal fusion so the thorax can continue to grow, potentially increasing lung volume
- Poor PFT values have been reported in EOS grads who have undergone growing rod treatment
~ 50% pred FVC % and FEV₁% (SRS 2015 eposter #220)
- Clinical impression: kids with EOS are limited, not as active as their peers

OBJECTIVE

- To obtain activity data during a typical week + weekend in patients > 1yr from last GR/definitive fusion surgery (holidays excluded)
- To assess participation and daily function
 - Weekday **Monday-Friday**
 - scheduled activity
 - Weekend day **Saturday-Sunday**
 - self-selected activity

METHODS

- **11 patients with EOS were invited to wear a Step Activity Monitor (SAM)** (StepWatch™, Modus, WA)
 - Prospective IRB approved study
- **Wear time included morning-bedtime** *excluding bathing/swimming*
- **Data were logged every 10sec**



METHODS

- Custom Matlab (Mathworks, MA) code used for analysis
- Step Activity Data Week **M-F** and Weekend **Sat/Sun**
 - Steps/day
 - Activity Time **accumulated time steps are taken in the day**
 - Intensity and Duration
 - >10% of Daily Activity Time in continuous (>5min) non stop activity
 - Student t-Test **$p < 0.05$**
- Correlation between SAM and PFT
 - Spearman's Coefficient **$p < 0.05$**

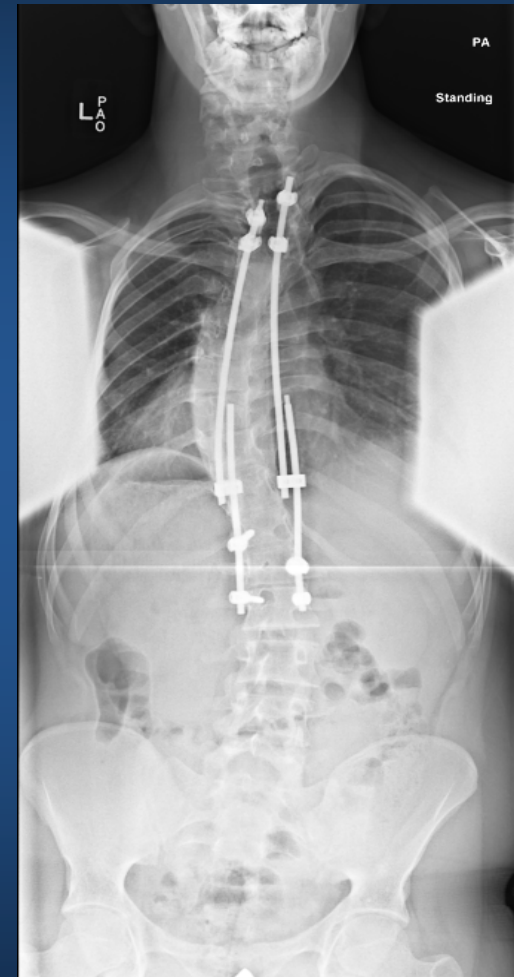
RESULTS Demographics

EOS diagnoses:

- 4 congenital
- 3 idiopathic
- 2 syndromic
- 2 neuromuscular



Preop, 5 years old



Most-recent 16.2 yo
8 lengthenings, 0 complications
62.1 months since last surgery

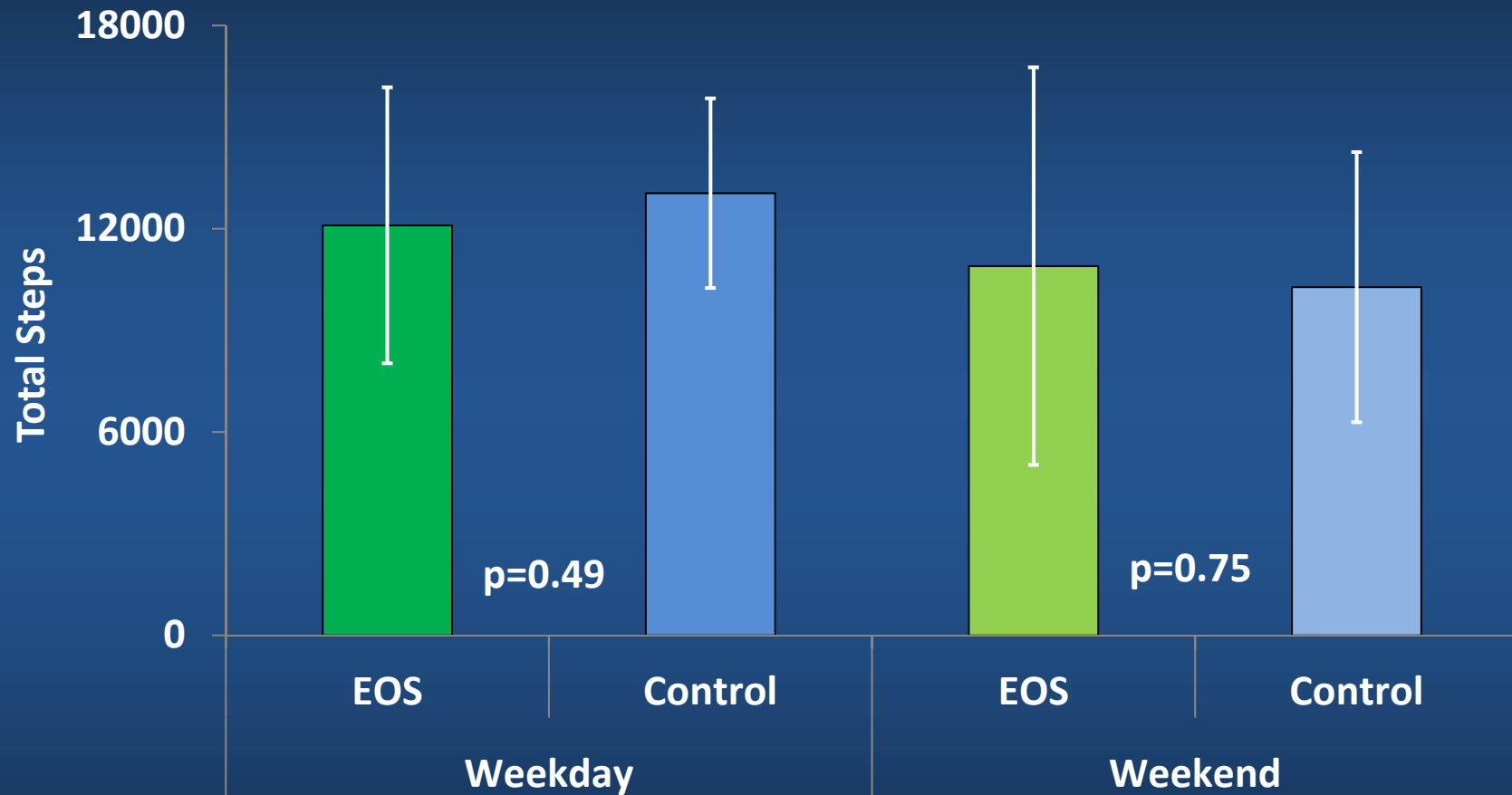
RESULTS Demographics



	EOS n=11	Control n=20	p value
Age at test	12.6	13.1	0.592
Height	150	157	0.215
Weight	38.8	52.2	0.090

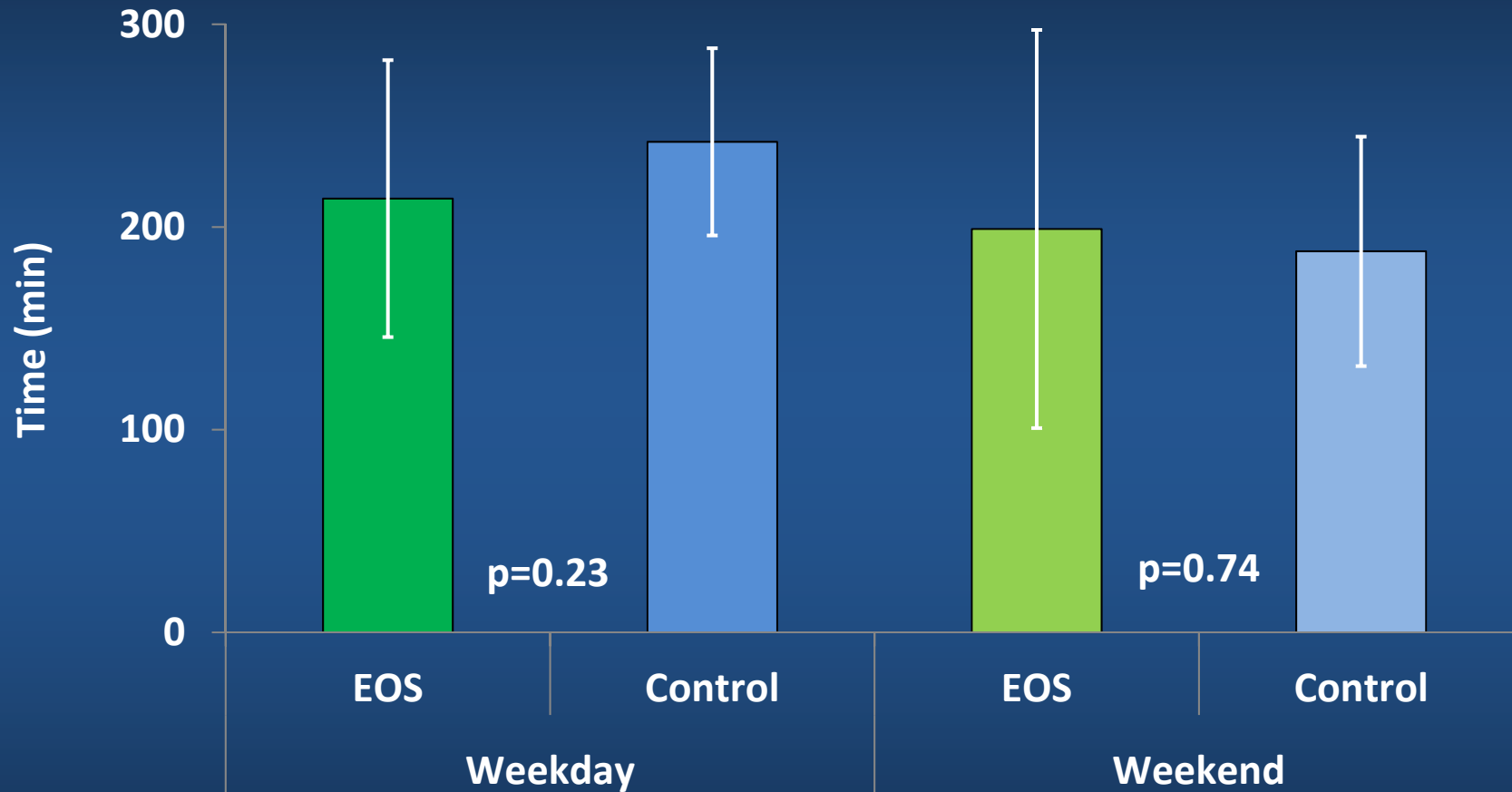
	EOS Surgical			EOS PFT			
	Last 6x months	Definitive Fusion	Observation	FVC _{abs}	FVC %	FEV _{1 abs}	FEV _{1 %}
EOS n=11	42.2 23.9-66.2	6/11	4/11	1.2 (0.48-2.04)	48.4 (23-80)	1.2 (0.40-2.59)	50.5 (15-77)

RESULTS Total Steps



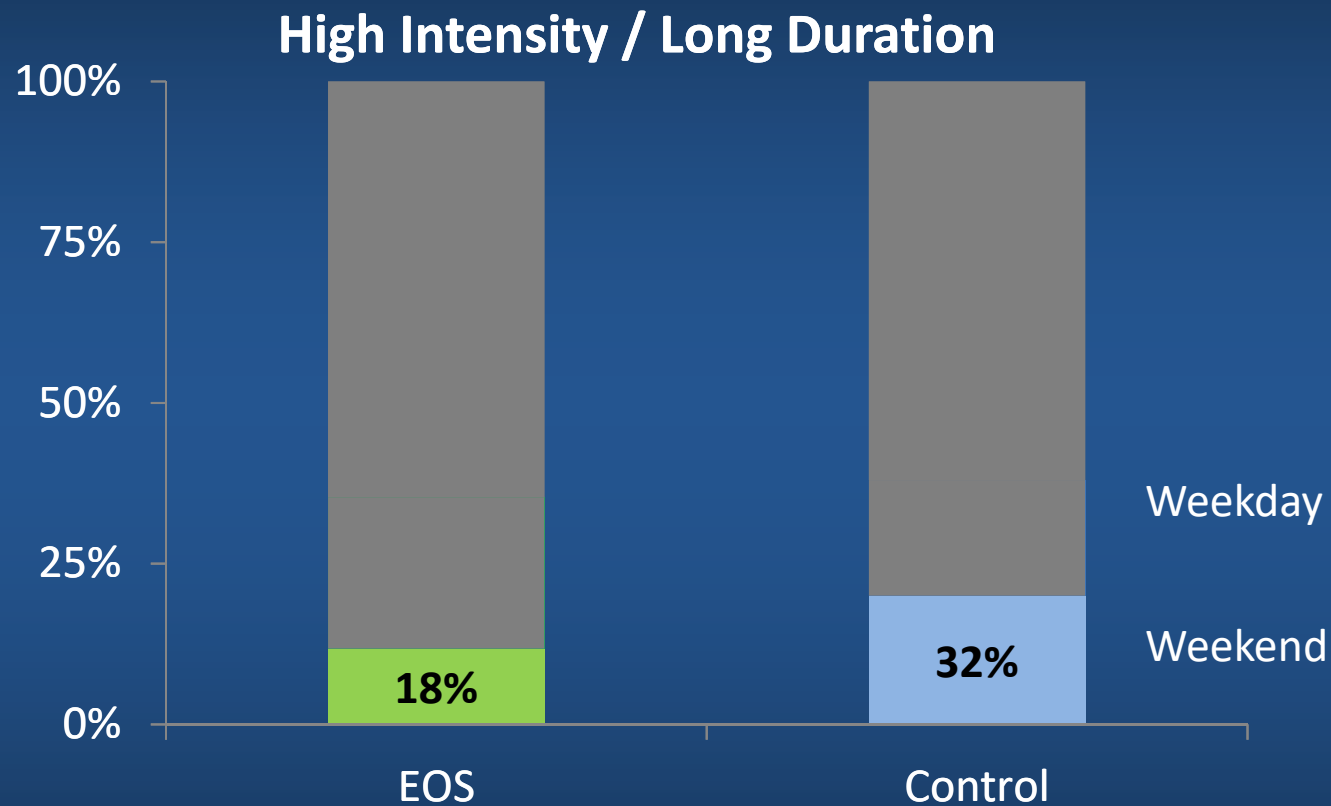
- Total Steps were the same for EOS and Controls
 - Weekday and Weekend **P = ns**

RESULTS Total Active Time



- Total Active Time was the same for EOS and Controls
 - Weekday and Weekend **P = ns**

RESULTS Intensity/Duration



- Fewer EOS patients chose to spend their time at a continuously high intensity level on the Weekend

CONCLUSION

- PFT's – underwhelming result ~50% pred value
 - No correlations were found to SAM data
- Step Activity data shows that patients with EOS take the same number of steps and spend the same amount of time in Activity during the week as their peers
- Despite pulmonary “limitations”, daily activity measures suggest no significant limitation in activity or active time



Thank You