



Wheelchair Cushion Degradation during Everyday Use

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Introduction

- In the US, wheelchair cushions are deemed durable medical equipment – therein, the life expectancy is 60 months
- Understanding variations in cushion performance over time during use can inform design and clinical interventions

Objectives

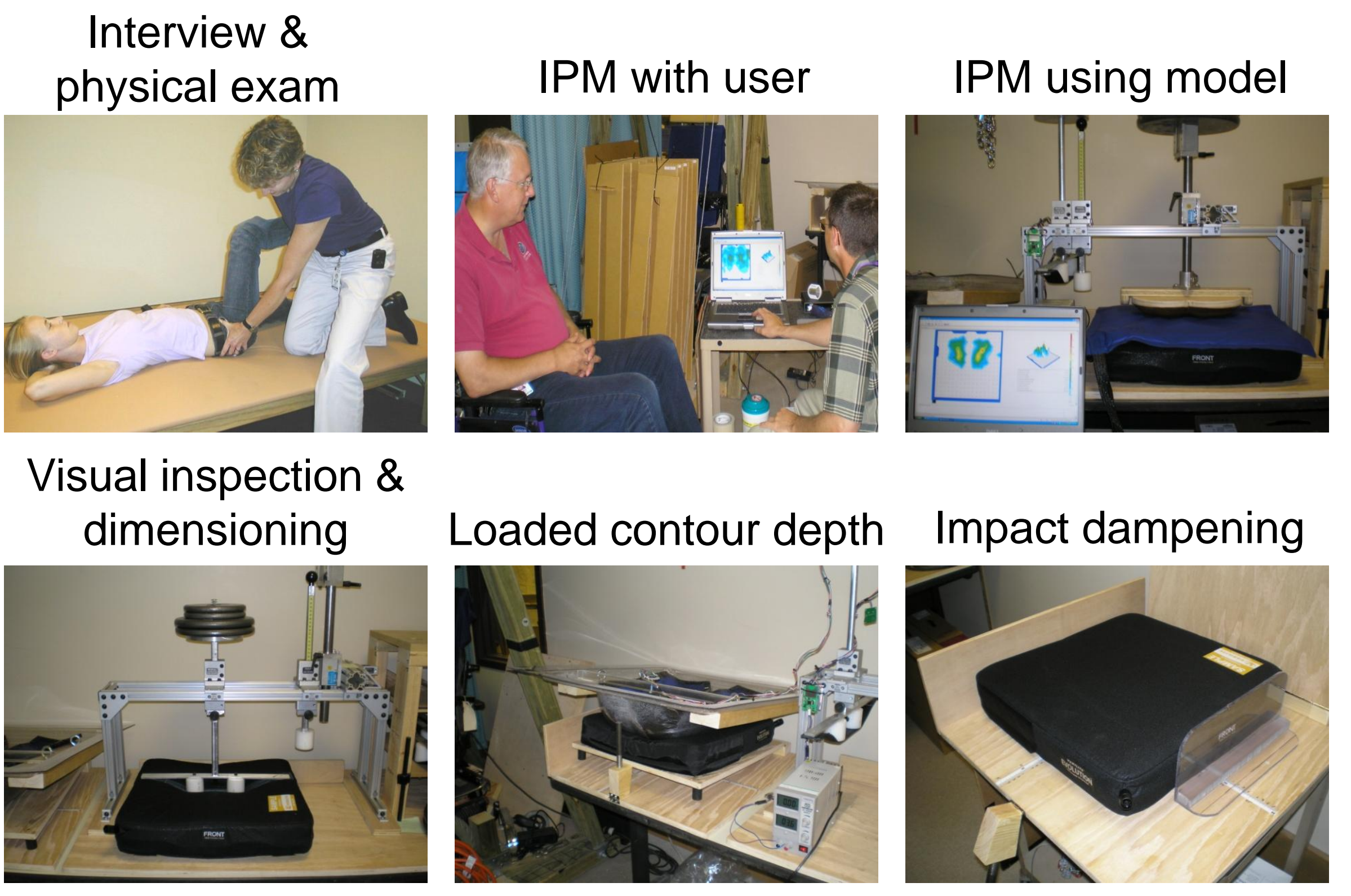
- Document cushion performance over lifespan
- Identify predictors of cushion degradation
- Develop and validate a clinical measure of seat cushion degradation

Methods

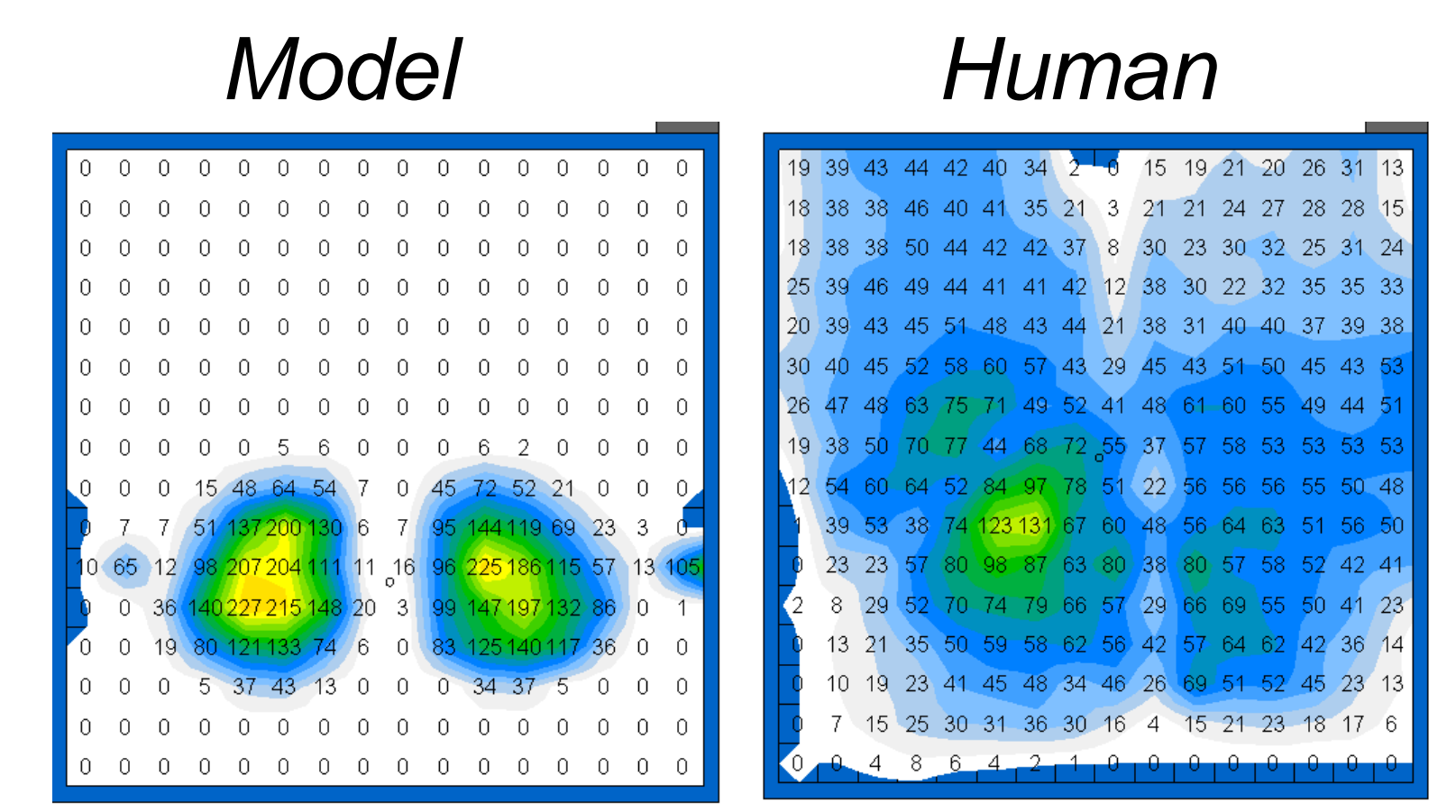
- 138 different cushions studied
 Most common: Jay2 (32), Roho Hi Profile (26), Evolution (14)
- Repeated measures on 24 cushions
- Mean cushion age = 24 months
 - Range: 1 day to 168 months

Data Collection

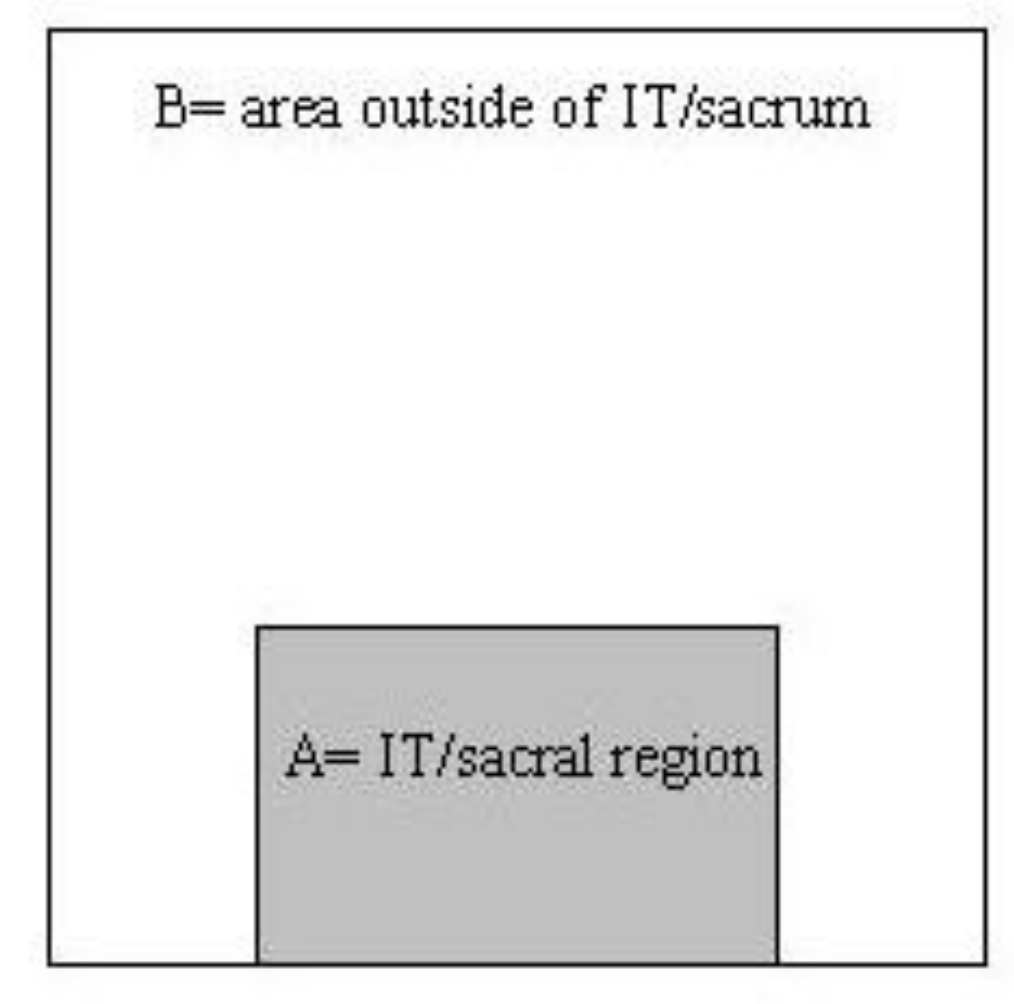
- Client evaluation – diagnosis, weight, pressure ulcer history
- Visual inspection of cushion
- Cushion performance measures using human and buttock model interface pressure measurement (IPM)



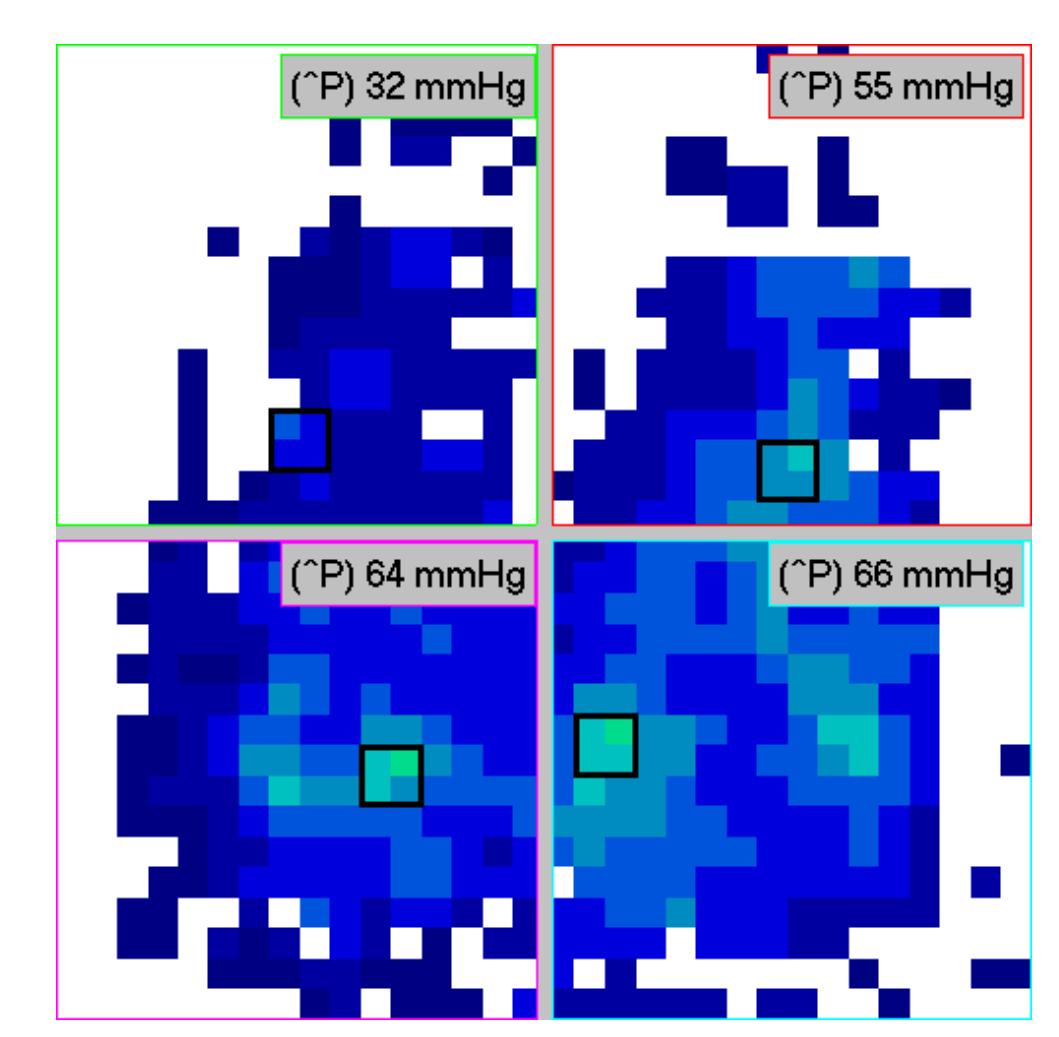
Interface pressure measurement (IPM)



IPM metrics include:
 magnitude
 asymmetry
 dispersion

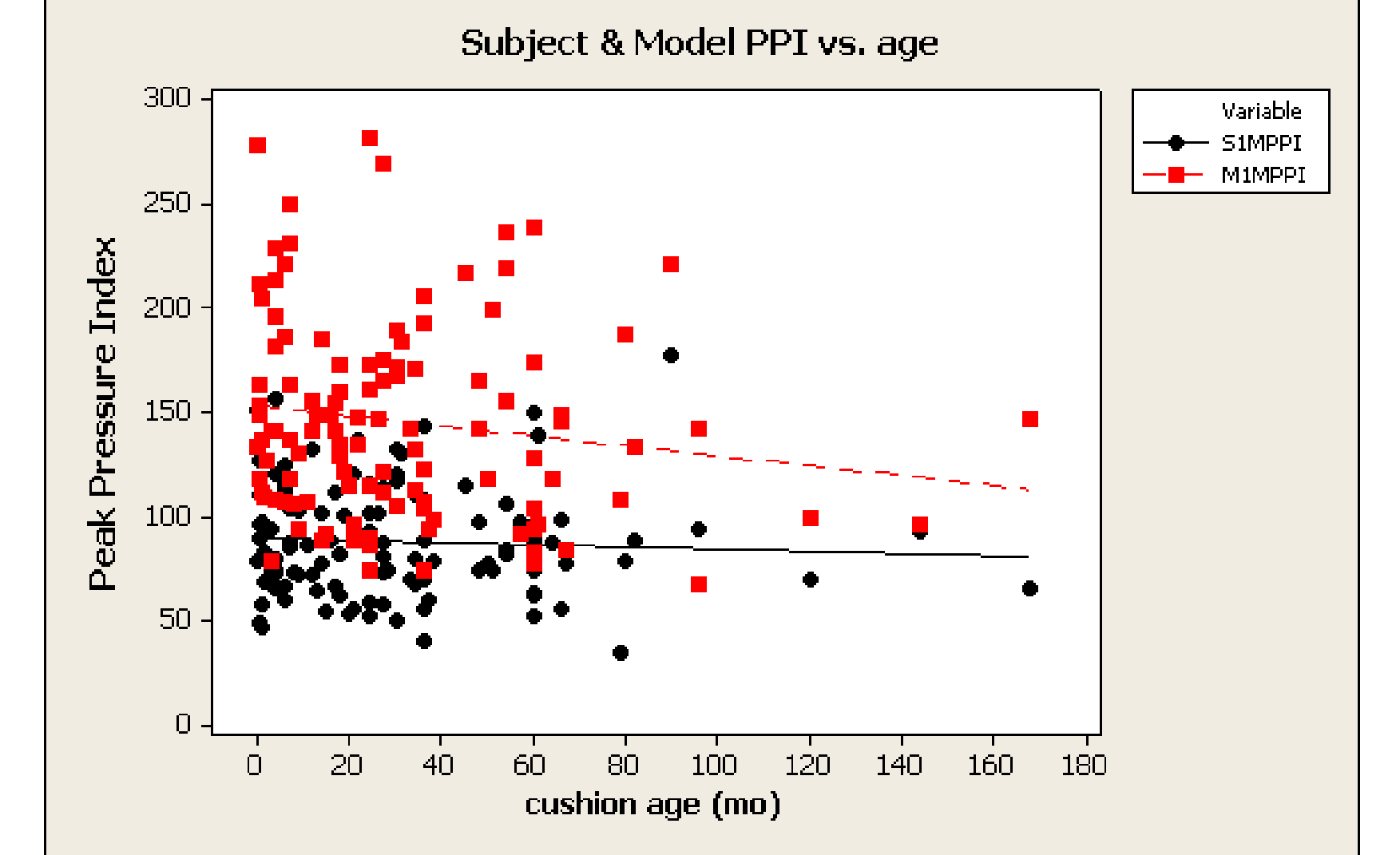


DI= ratio of IT pressures to total pressure



PPI= measure of pressure magnitude

Pressure magnitudes: ALL 162 cushions



Clinician's are 5 1/2 times more likely to judge a foam cushion as inadequate compared to a non-foam cushion

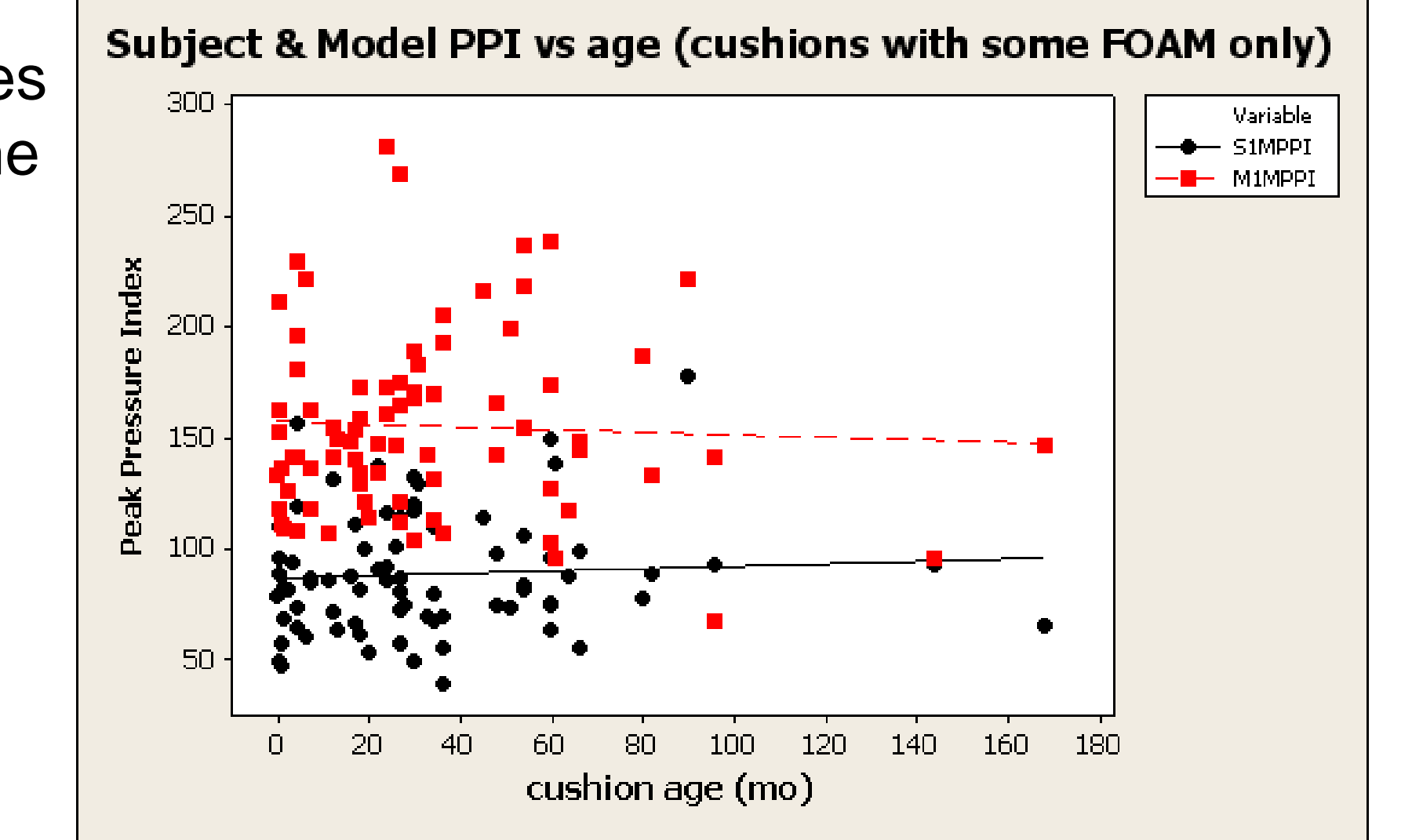
Results

Both model and subject pressures indicate NO relationship over time

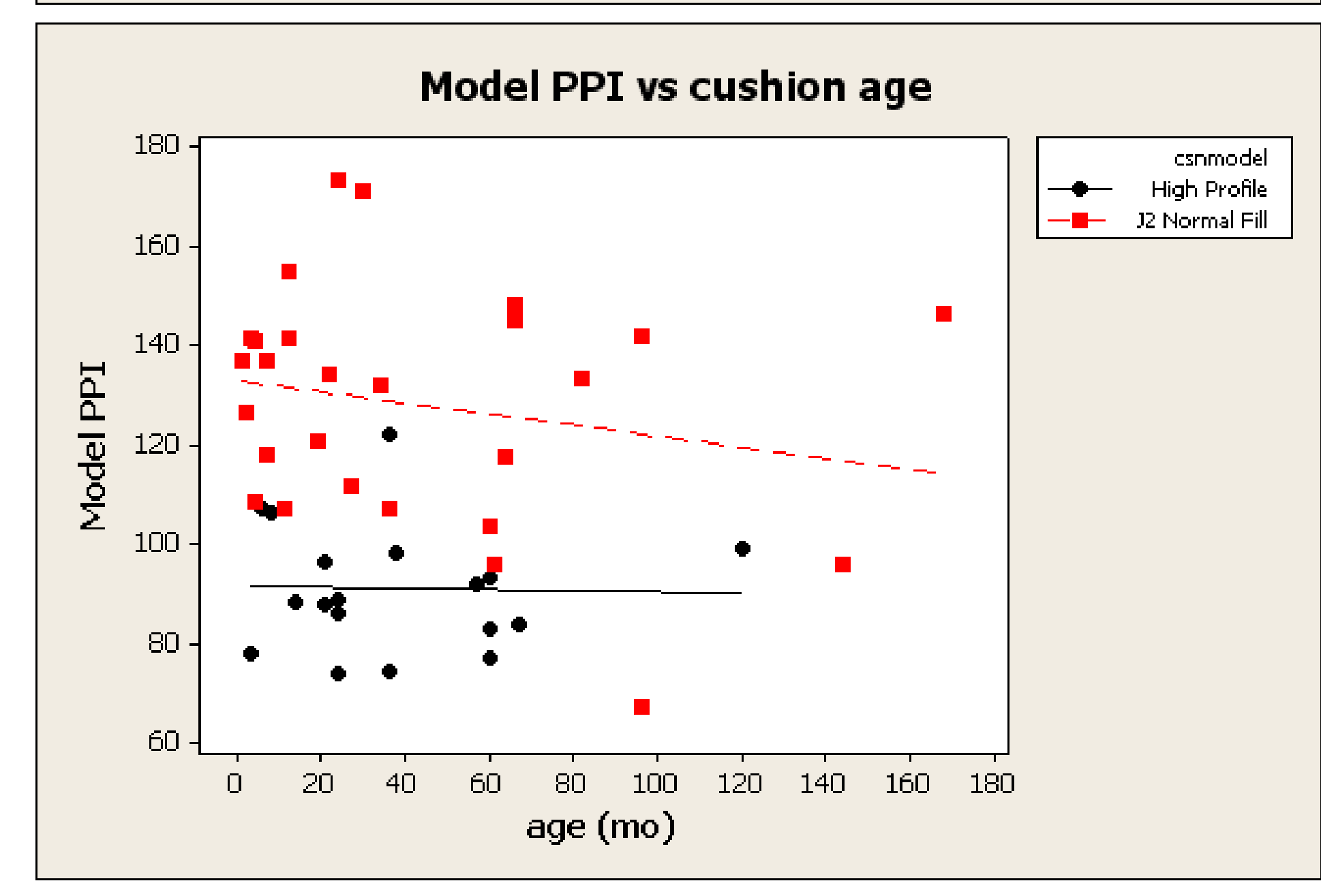
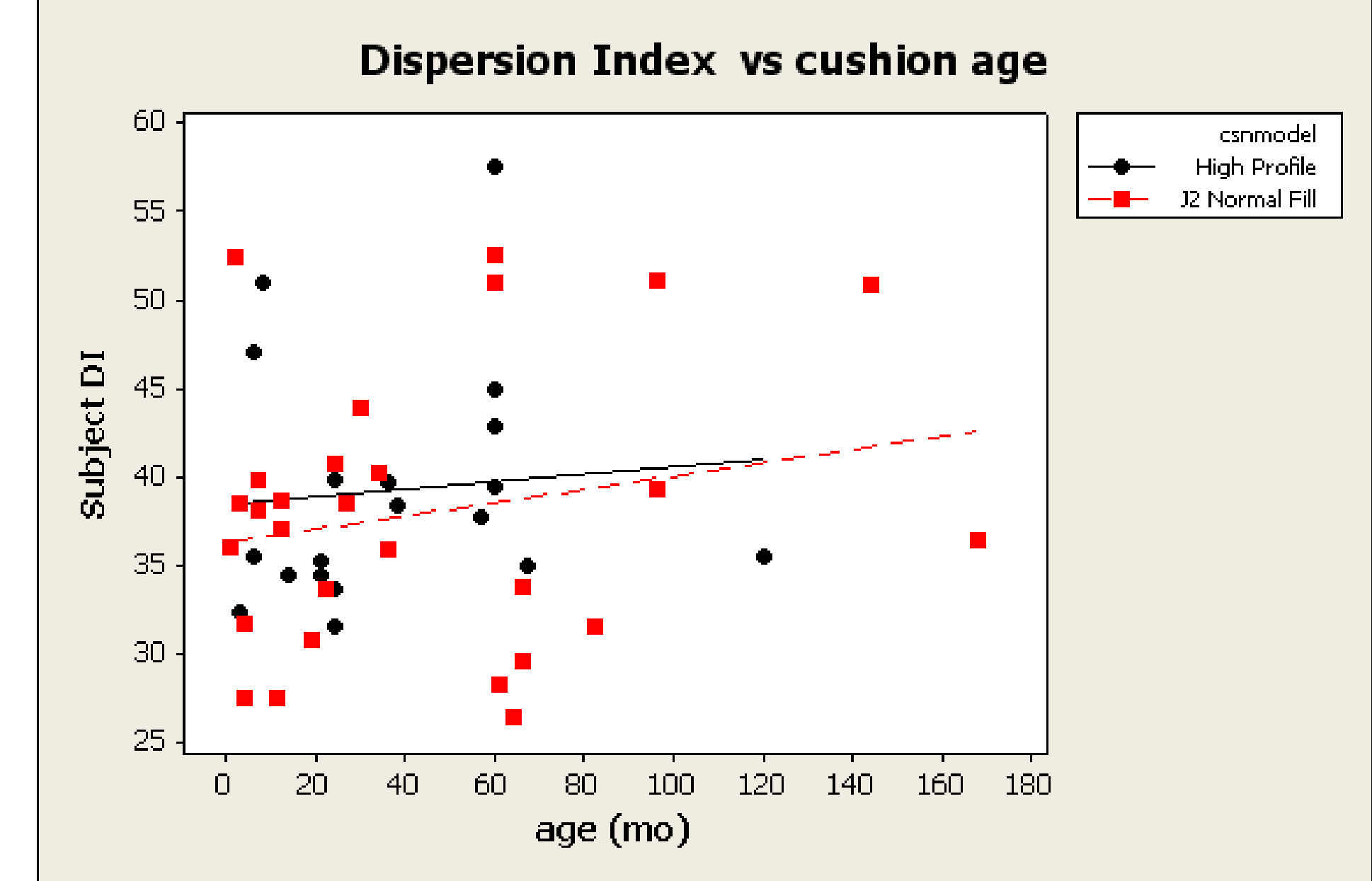
Black: IPM from cushion user
 Red: IPM using buttock model

Look at variability of red model data compared to variability of black subject data

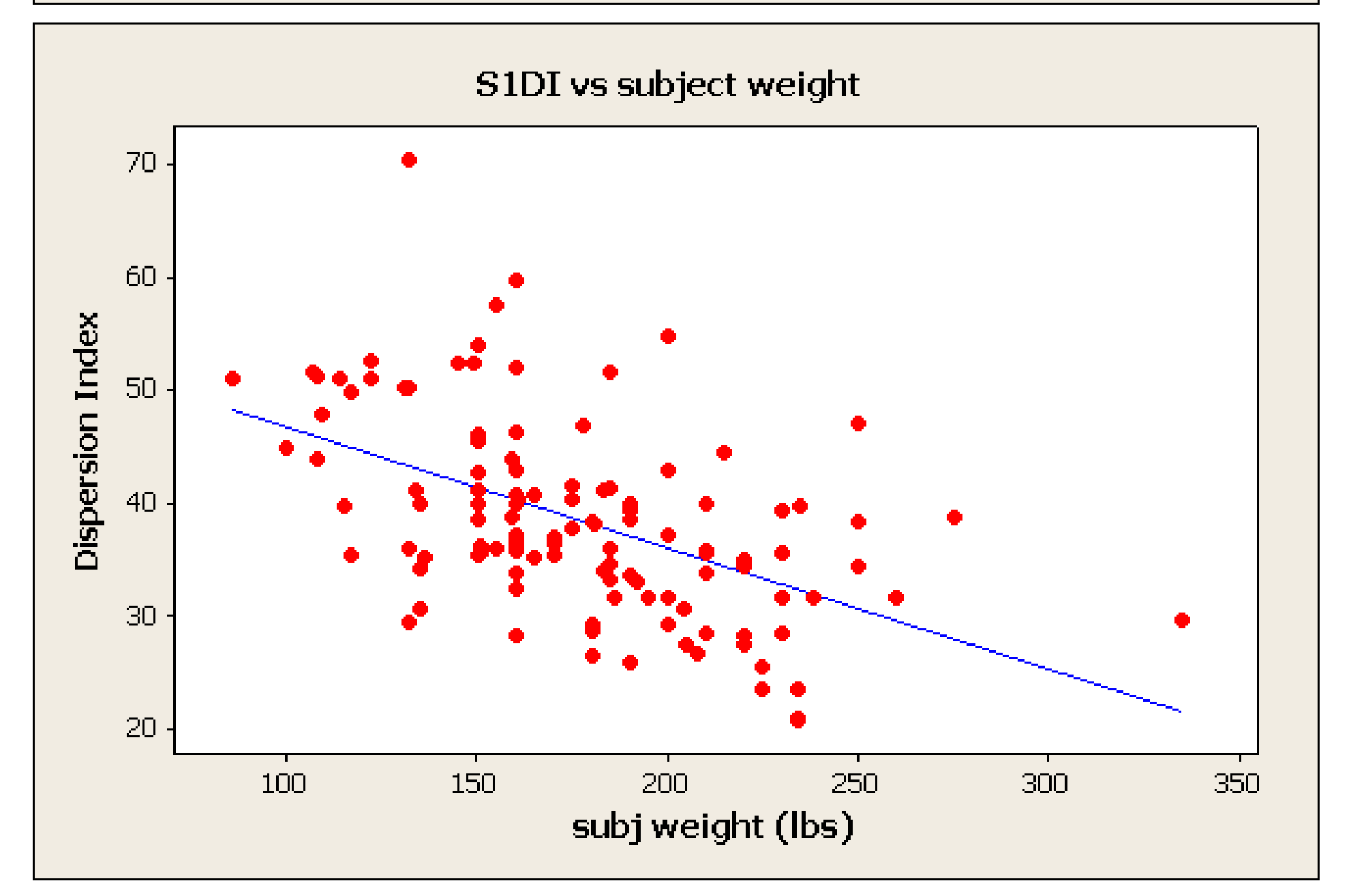
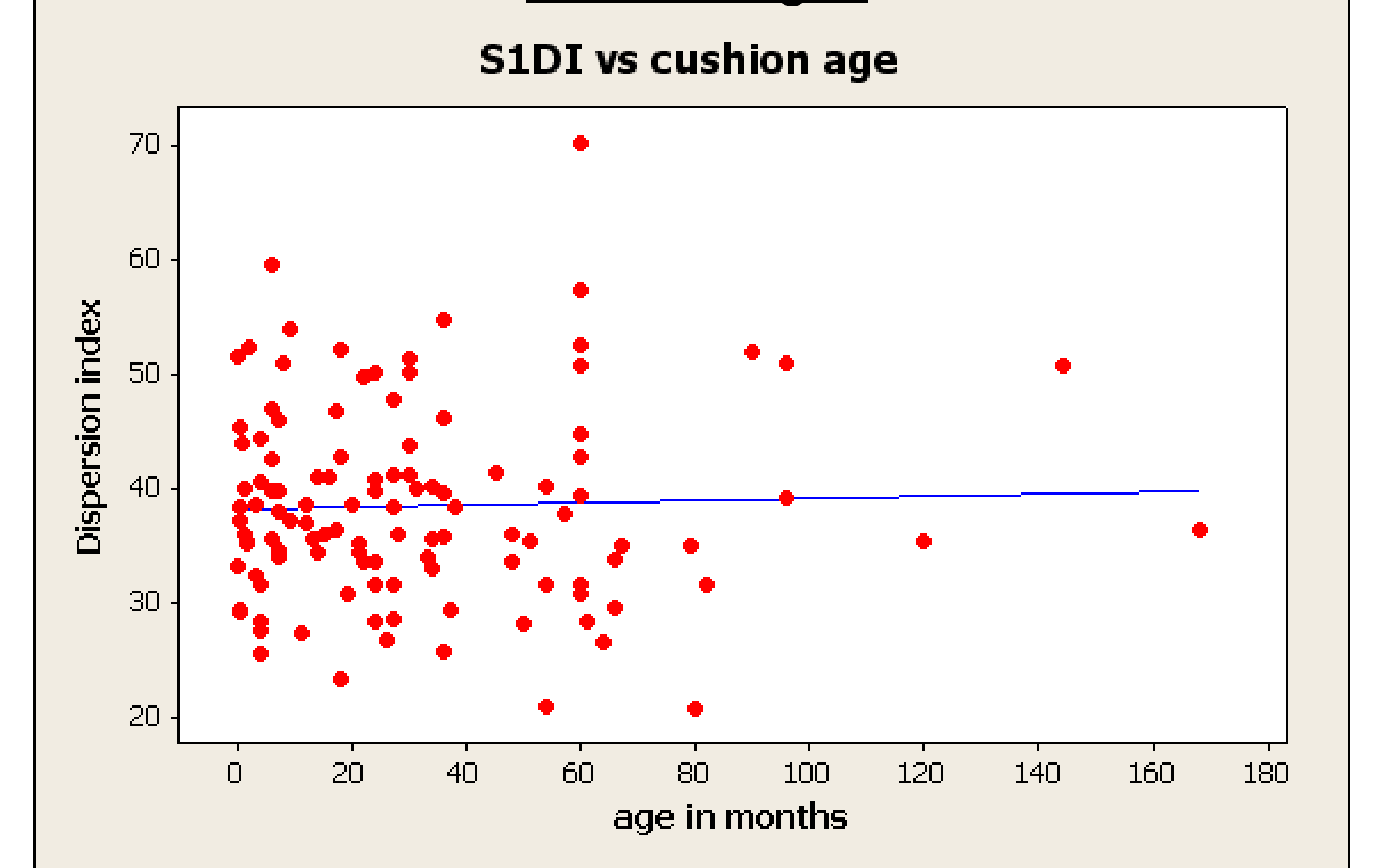
Pressure magnitudes: FOAM-based cushions



Roho and Jay2 Cushion Performance



Predicting DI change using cushion age & user weight



Conclusions

- Within this study, cushion age is not a predictor of performance; therapists were more likely to judge a cushion as 'inadequate' as it ages ($p=0.003$) but no change in performance was evident
- User body weight predicted the percentage of loading directly under the ischial region ($R-sq = .38$)
- Roho and Jay2 cushion performance varies considerably across users, but regression analysis indicates performance does not change appreciably over time
- Because performance varies widely across users, cushion degradation is individualistic and difficult to discern systematically

Acknowledgements

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For more information, please visit www.mobilityerc.gatech.edu

