University of Pittsburgh

Staying Active with Arthritis: An Intervention Guided by Self-Efficacy

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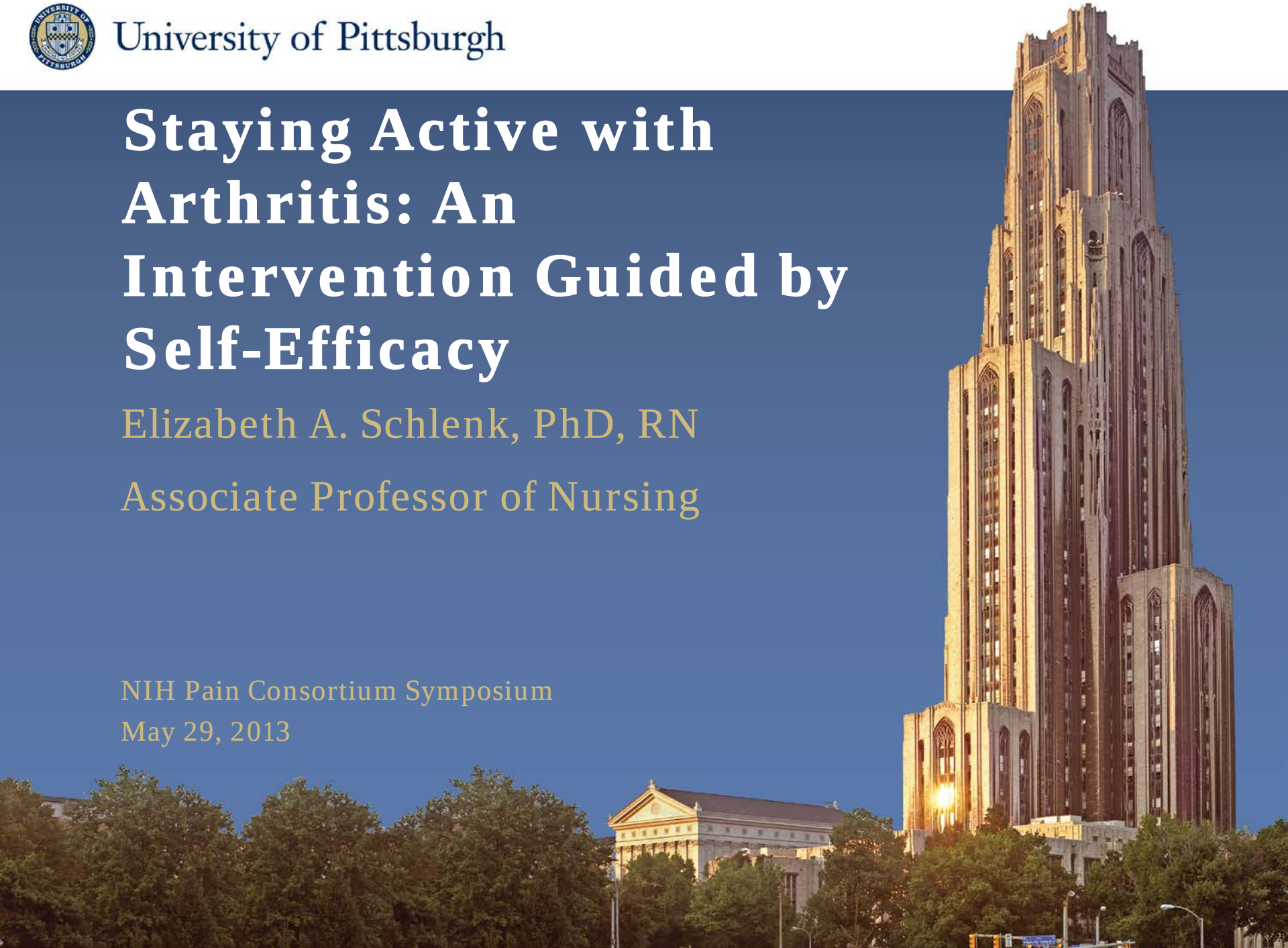
NIH Pain Consortium Symposium

May 29, 2013



Acknowledgements

- NIH, NINR, R01 NR 010904, Promoting Physical Activity in Older Adults with Comorbidity (Staying Active with Arthritis Study or STAR Study)

Acknowledgements

- Co-Investigators
  - G. Kelley Fitzgerald, PhD, PT
  - C. Kent Kwoh, MD
  - Joan Rogers, PhD, OTR/L
  - Susan Sereika, PhD
- Study Staff
  - Alex Begey, BS
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  - Debbie Myers, BA
  - Gale Podobinski, BSIS
  - A. Blair Powell, BS
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  - Jennifer Rush, MPH
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Overview

- Background and significance
- Design and methods
  - Sample
  - Self-efficacy theory
  - Intervention
  - Measures
  - Analyses
- Preliminary results of the relationship between arthritis self-efficacy for pain management and pain

Background and Significance

- Over 9 million Americans have symptomatic osteoarthritis of the knee (OAK) (Lawrence et al., 2008)
- Physical activity (PA) programs in persons with OAK improve function, **pain**, quadriceps strength, and fitness walking without worsening disease (Ettinger et al., 1997; Hughes et al., 2004; Roddy et al., 2005; Schlenk et al., 2011)
- Half of those with OAK have hypertension (HBP) (Ettinger et al., 1994)

Background and Significance

- Persons with OAK have reductions in BP when they participate in a regular regimen of PA (Minor et al., 1989)
- Small decreases in SBP and DBP found with PA are clinically significant (Pascatello et al., 2004)
- Only 15% of persons with OA and 47% with HBP engage in regular PA (U.S. DHHS, 2000; Lopez et al., 2009)

Purpose

- Investigate how the individually delivered, home-based, 6-month STAR intervention affects:
  - Lower extremity exercise (flexibility, strengthening, balance)*
  - Fitness walking*
  - Functional status*
  - BP*
  - **Pain**
  - Fatigue
  - Quadriceps strength
  - Health-related quality of life (HRQoL)

*Primary Outcome

Design

- Randomized controlled, parallel 2-group design with treatment and attention control groups
- Assessments by blinded assessor at:
  - Baseline
  - End of the 6-month intervention period
  - 6 months after the intervention period ends

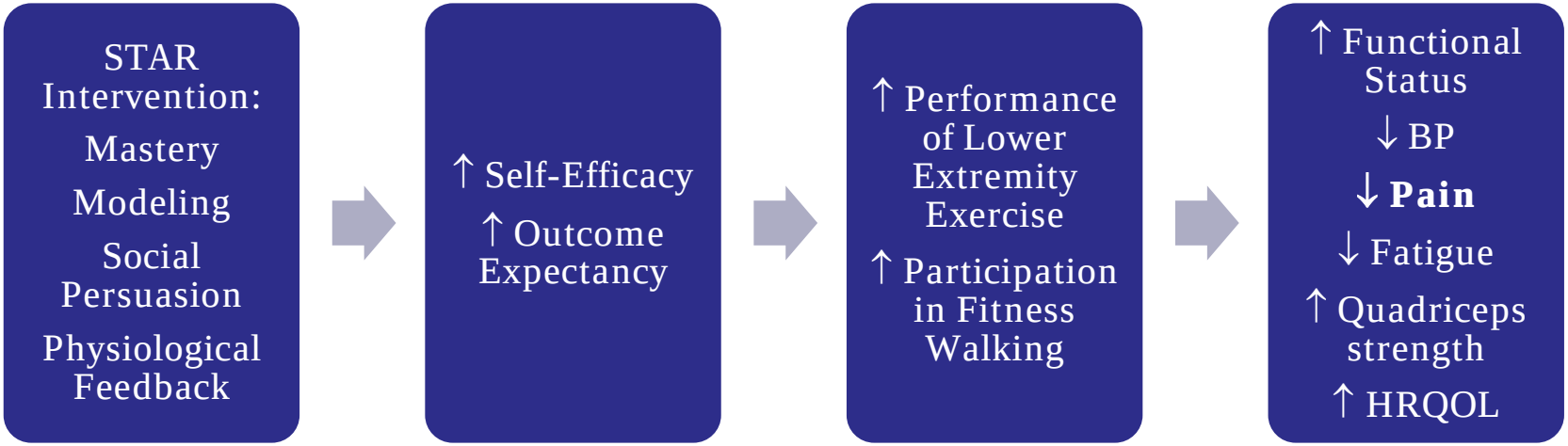
Convenience Sample

- 180 community-dwelling adults age 50 years or older with OAK and HBP treated with anti-hypertensive medication

Recruitment Strategies

- Registries
  - Pittsburgh Pepper Center Registry
  - University Center for Social and Urban Research Gerontology Program Research Registry
  - University of Pittsburgh Clinical and Translational Science Institute Registry
- Public domain mailing lists from vendors
- Self-referral through various sources

Conceptual Model of the STAR Study



STAR Intervention Group

- 24-weeks
  - Usual care
  - 6 weekly individual face-to-face sessions with PT for evaluation, graduated therapeutic exercises, and progressive fitness walking
  - 9 bi-weekly telephone sessions with RN for ongoing support
  - 3 telephone check-ups with RN during 6-month follow-up

- Components:
  - Self-efficacy strategies threaded through the sessions
  - Session topics:
    - Education on OAK and HBP
    - Starting lower extremity exercises
    - Starting fitness walking
    - **Pain management**
    - Use of heat and cold
    - Normal body signals vs. warning signs
    - Scheduling PA
    - Unpleasant sensations with exercise
    - Setbacks
    - Avoiding risks of exercise
    - Support from others
    - Motivational/persistence techniques
    - Self-persuasion
    - Generalizing to other types of PA

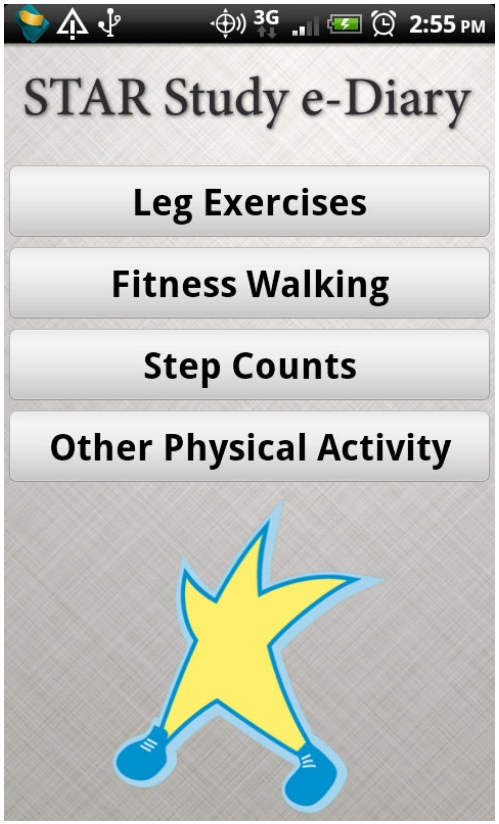
Attention Control Group

- 24-weeks
  - Usual care
  - 6 weekly and 9 biweekly telephone sessions with RN
  - 3 telephone check-ups with RN during 6-month follow-up
- Components (from NIHSeniorHealth web site):
  - Talking with your PCP
  - Sleep and aging
  - Eating healthy (2 parts)
  - Immunizations
  - Cancer screenings
  - Injury prevention (2 parts)
  - Osteoporosis
  - Hearing loss
  - Low vision
  - Oral health
  - Foot care
  - Mental health (depression)

Outcomes: Performance of Lower Extremity Exercise

- e-Diary in terms of the total volume of lower extremity exercise (i.e., the number of days the subject reports completing a lower extremity exercise session and the total number of lower extremity exercises per day performed [sets x repetitions] over a 7-day period

STAR Study e-Diary



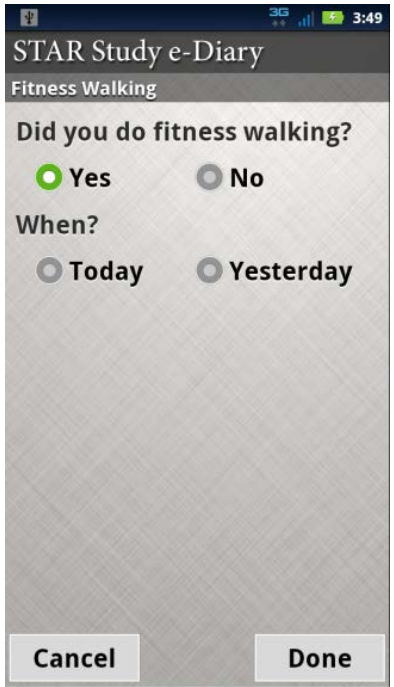
STAR Study e-Diary: Leg Exercises

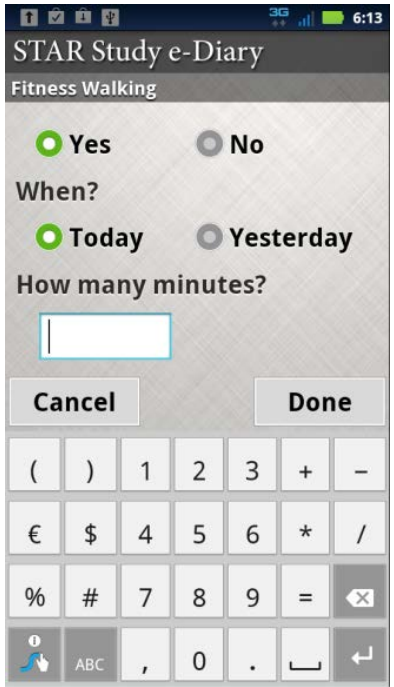
Leg exercises 2-3 times per week are designed to increase range of motion, strength, and balance

A. Stretching, Range of Motion
    1. Hamstring Stretch
    2. Calf Stretch
    3. Heel Slide
B. Strengthening
    1. Quad Set
    2. Standing Heel Raise
    3. Standing Wall Slide
    4. Straight Leg Raise
    5. Hip Abduction
    6. Short Arc Quad
C. Standing Balance
    1. Side-by-Side
    2. Semi-Tandem
    3. Tandem
    4. One-Legged

STAR Study e-Diary: Fitness Walking

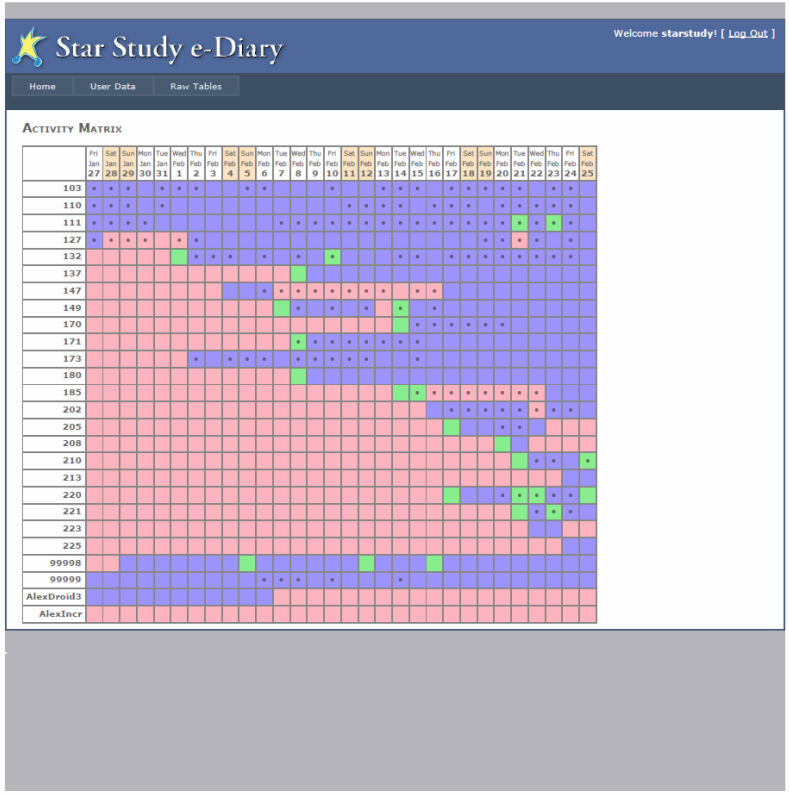
- Walking for at least ten minutes at a brisk pace that makes you breathe faster
- Goal is 150 min/week





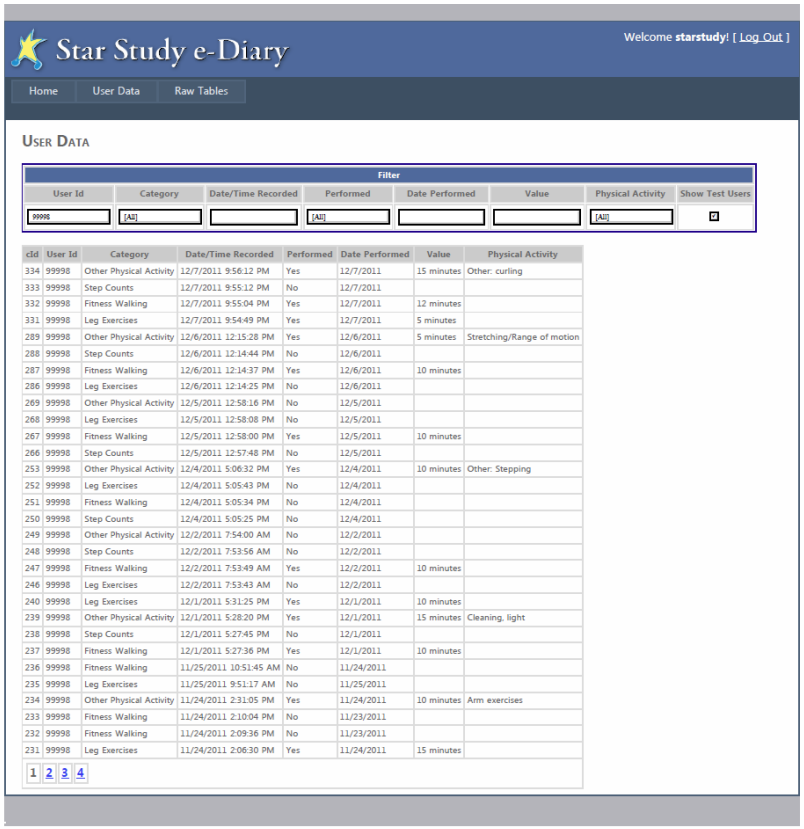
STAR Study e-Diary: Website Uploads Matrix

Home Page



- Green: Data uploaded
- Purple: Data uploaded more than once
- Red: Data not uploaded
- Dot: Data entered

STAR Study e-Diary: Website User Data



Star Study e-Diary

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Home | User Data | Raw Tables

User Data

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cId	User Id	Category	Date/Time Recorded	Performed	Date Performed	Value	Physical Activity
334	99998	Other Physical Activity	12/7/2011 9:56:12 PM	Yes	12/7/2011	15 minutes	Other: curling
333	99998	Step Counts	12/7/2011 9:55:12 PM	No	12/7/2011		
332	99998	Fitness Walking	12/7/2011 9:55:04 PM	Yes	12/7/2011	12 minutes	
331	99998	Leg Exercises	12/7/2011 9:54:49 PM	Yes	12/7/2011	5 minutes	
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269	99998	Other Physical Activity	12/5/2011 12:58:16 PM	No	12/5/2011		
268	99998	Leg Exercises	12/5/2011 12:58:08 PM	No	12/5/2011		
267	99998	Fitness Walking	12/5/2011 12:58:00 PM	Yes	12/5/2011	10 minutes	
266	99998	Step Counts	12/5/2011 12:57:48 PM	No	12/5/2011		
253	99998	Other Physical Activity	12/4/2011 5:06:32 PM	Yes	12/4/2011	10 minutes	Other: Stepping
252	99998	Leg Exercises	12/4/2011 5:05:43 PM	No	12/4/2011		
251	99998	Fitness Walking	12/4/2011 5:05:34 PM	No	12/4/2011		
250	99998	Step Counts	12/4/2011 5:05:25 PM	No	12/4/2011		
249	99998	Other Physical Activity	12/2/2011 7:54:00 AM	No	12/2/2011		
248	99998	Step Counts	12/2/2011 7:53:56 AM	No	12/2/2011		
247	99998	Fitness Walking	12/2/2011 7:53:49 AM	Yes	12/2/2011	10 minutes	
246	99998	Leg Exercises	12/2/2011 7:53:43 AM	No	12/2/2011		
240	99998	Leg Exercises	12/1/2011 5:31:25 PM	Yes	12/1/2011	10 minutes	
239	99998	Other Physical Activity	12/1/2011 5:28:20 PM	Yes	12/1/2011	15 minutes	Cleaning, light
238	99998	Step Counts	12/1/2011 5:27:45 PM	No	12/1/2011		
237	99998	Fitness Walking	12/1/2011 5:27:36 PM	Yes	12/1/2011	10 minutes	
236	99998	Fitness Walking	11/25/2011 10:51:45 AM	No	11/24/2011		
235	99998	Leg Exercises	11/25/2011 9:51:17 AM	No	11/25/2011		
234	99998	Other Physical Activity	11/24/2011 2:31:05 PM	Yes	11/24/2011	10 minutes	Arm exercises
233	99998	Fitness Walking	11/24/2011 2:10:04 PM	No	11/23/2011		
232	99998	Fitness Walking	11/24/2011 2:09:36 PM	No	11/23/2011		
231	99998	Leg Exercises	11/24/2011 2:06:30 PM	Yes	11/24/2011	15 minutes	

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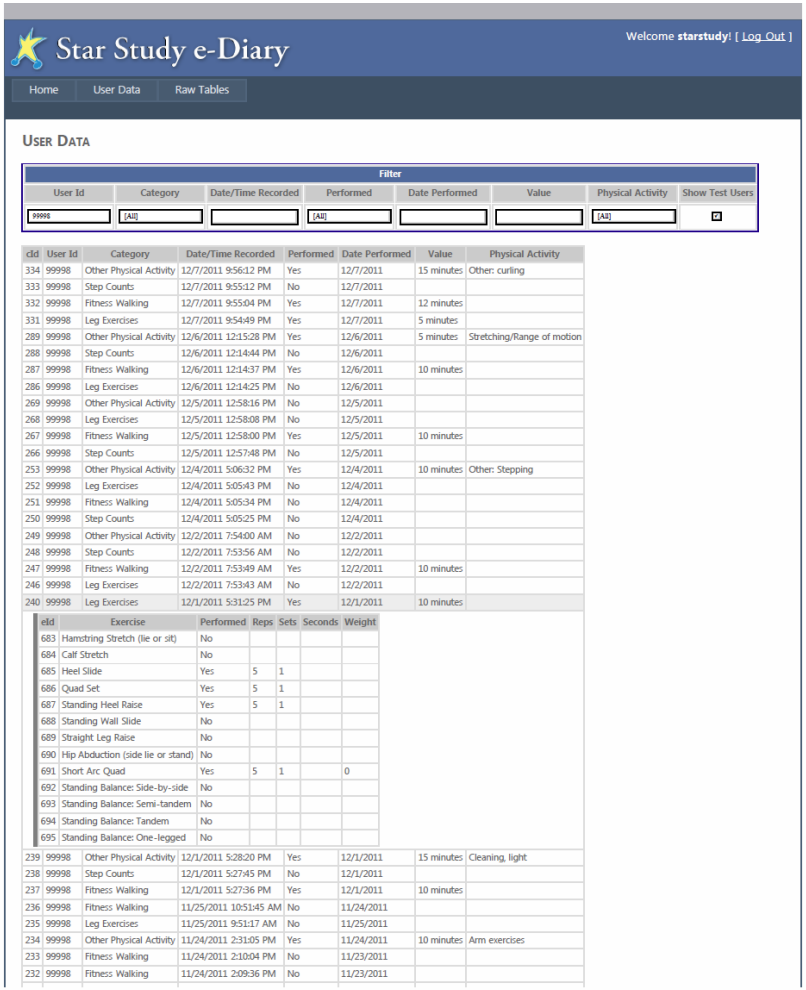
STAR Study e-Diary: Website User Data: Leg Exercise



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eid	Exercise	Performed	Reps	Sets	Seconds	Weight
683	Hamstring Stretch (lie or sit)	No				
684	Calf Stretch	No				
685	Heel Slide	Yes	5	1		
686	Quad Set	Yes	5	1		
687	Standing Heel Raise	Yes	5	1		
688	Standing Wall Slide	No				
689	Straight Leg Raise	No				
690	Hip Abduction (side lie or stand)	No				
691	Short Arc Quad	Yes	5	1		0
692	Standing Balance: Side-by-side	No				
693	Standing Balance: Semi-tandem	No				
694	Standing Balance: Tandem	No				
695	Standing Balance: One-legged	No				

239	99998	Other Physical Activity	12/1/2011 5:28:20 PM	Yes	12/1/2011	15 minutes	Cleaning, light
238	99998	Step Counts	12/1/2011 5:27:45 PM	No	12/1/2011		
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232	99998	Fitness Walking	11/24/2011 2:09:36 PM	No	11/23/2011		

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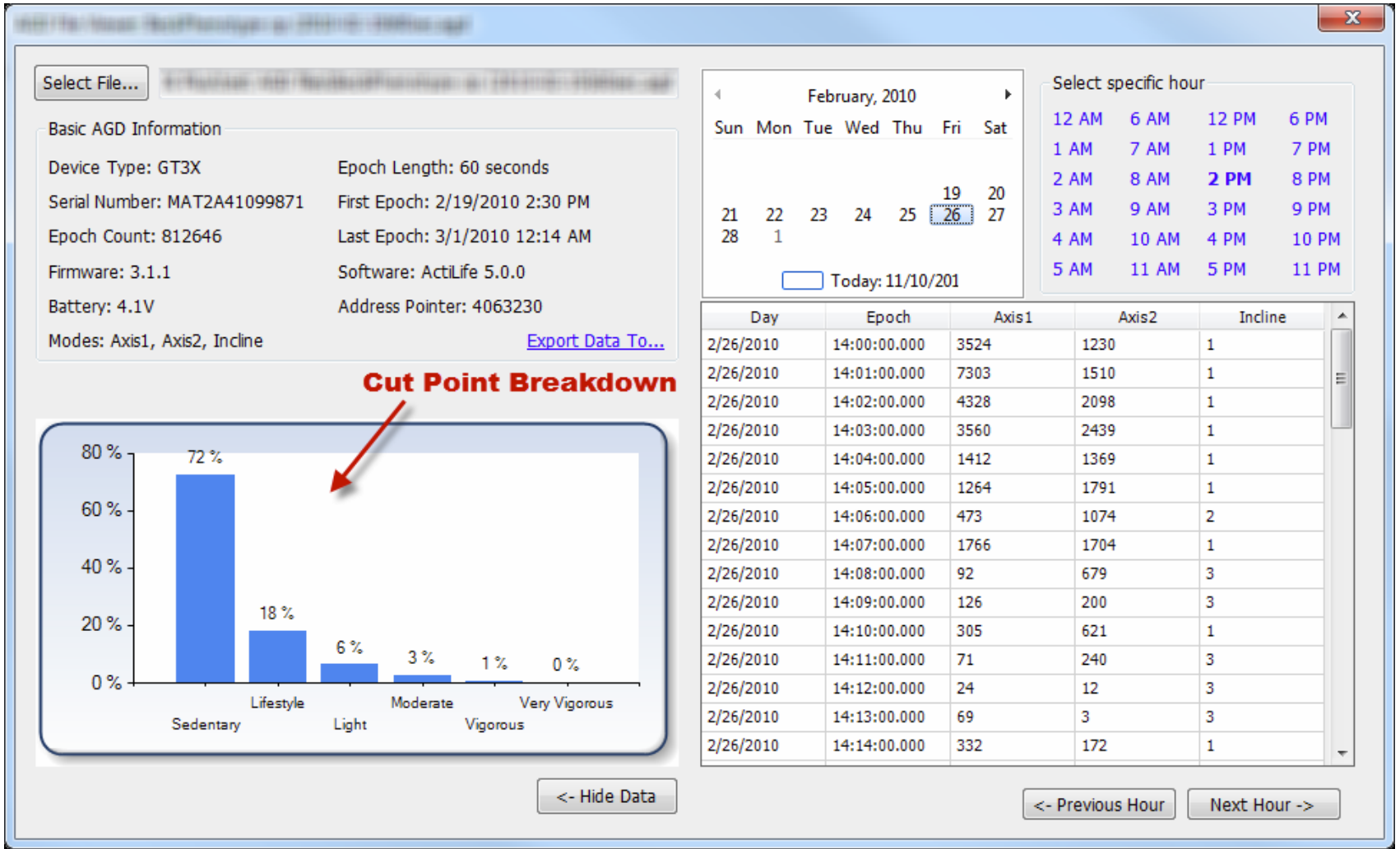
Outcomes: Participation in Fitness Walking

- GT3X ActiGraph accelerometer
  - Total activity counts per minute over a 7-day period converted into kilocalories and metabolic equivalents (MET)
  - Minutes of light, moderate, and vigorous PA over a 7-day period

ActiLife5 AGD File Viewer



ActiLife 5 Data Tables

Date	Time	Axis1	Axis2	Axis3	Vector Magnitude
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2/16/2012	8:50:00	1380	2478	1792	3355.02
2/16/2012	8:51:00	87	284	637	702.85
2/16/2012	8:52:00	109	342	794	871.37
2/16/2012	8:53:00	282	508	1074	1221.09
2/16/2012	8:54:00	291	880	981	1349.61
2/16/2012	8:55:00	0	0	0	0
2/16/2012	8:56:00	0	0	0	0
2/16/2012	8:57:00	0	0	0	0
2/16/2012	8:58:00	0	0	0	0
2/16/2012	8:59:00	0	0	0	0
2/16/2012	9:00:00	0	0	7	7
2/16/2012	9:01:00	192	662	677	966.15
2/16/2012	9:02:00	174	559	1036	1189.98
2/16/2012	9:03:00	0	0	110	110
2/16/2012	9:04:00	2	109	329	346.59
2/16/2012	9:05:00	509	592	1726	1894.37
2/16/2012	9:06:00	142	738	777	1080.99
2/16/2012	9:07:00	20	22	62	68.76
2/16/2012	9:08:00	29	22	107	113.02
2/16/2012	9:09:00	34	69	92	119.92
2/16/2012	9:10:00	13	0	6	14.32
2/16/2012	9:11:00	0	0	0	0
2/16/2012	9:12:00	102	25	70	126.21
2/16/2012	9:13:00	527	655	900	1231.57
2/16/2012	9:14:00	852	795	824	1427.2
2/16/2012	9:15:00	213	549	796	990.14
2/16/2012	9:16:00	0	8	171	171.19
2/16/2012	9:17:00	60	159	464	494.14
2/16/2012	9:18:00	238	510	835	1006.96
2/16/2012	9:19:00	103	445	688	825.82
2/16/2012	9:20:00	77	443	665	802.75
2/16/2012	9:21:00	174	660	631	929.54
2/16/2012	9:22:00	3	40	72	82.42
2/16/2012	9:23:00	0	0	0	0
2/16/2012	9:24:00	0	0	0	0
2/16/2012	9:25:00	82	309	294	434.33
2/16/2012	9:26:00	299	518	861	1048.35
2/16/2012	9:27:00	76	259	522	587.66
2/16/2012	9:28:00	83	238	617	666.5
2/16/2012	9:29:00	0	0	2	2
2/16/2012	9:30:00	92	332	366	502.64

Outcomes: Functional Status

- Objective (performance) measures
  - 6-minute walk (distance of brisk walk in 6 minutes)*
  - Chair sit-and-reach (sit and reach to or past toes)
  - 8-foot up-and-go (stand up from chair, brisk walk around cone, and sit down)
  - Short Physical Performance Battery*
    - 4-meter walk (usual walk)
    - Repeated chair stands (stand up from a chair 5 times without using arms)
    - Standing balance (side-by-side, semi-tandem, tandem, and one-legged stands held for 30 seconds)

*Primary Outcome

Outcomes: Functional Status

- Subjective (self-report) measures
  - 17-item, 5-point Likert Physical Function subscale of the Western Ontario and McMaster Universities (WOMAC) Osteoarthritis Index, which assesses knee joint (right and left) function over the past 48 hours

Outcomes: Blood Pressure

- OMRON® HEM-907XL Automatic Professional Digital Blood Pressure Monitor assesses SBP and DBP in mm Hg using a standardized protocol

Outcomes: Pain

- 2-item Bodily Pain subscale of the Short Form-36v2 (SF-36v2), which collects information about pain over the past 4 weeks (possible range 0-100)
- 5-item, 5-point Likert Pain subscale of the WOMAC Osteoarthritis Index, which collects information about knee joint (right and left) pain for the past 48 hours (possible range 0-20)

Outcomes: Fatigue

- 9-item, 11-point Likert Brief Fatigue Inventory, which assesses fatigue severity

Outcomes: Quadriceps Strength

- MicroFET2 hand-held dynamometer assesses the isometric strength in pounds of the extensor muscles of both knees using published protocols

Outcomes: HRQoL

- SF-36v2 includes 36 items on Likert scales from both physical and mental health domains
  - 2 composite scores
  - 8 subscale scores

Mediators: Self-Efficacy and Outcome Expectancy

- 21-item, 11-point Likert Self-Efficacy Scale assesses self-efficacy for:
  - Overcoming setbacks to exercise (Barriers Self-Efficacy)
  - Continuing to exercise (Exercise Self-Efficacy)
- 20-item, 10-point Likert Arthritis Self-Efficacy Scale assesses self-efficacy to perform behaviors to self-manage:
  - **Pain**
  - Function
  - Other Symptoms
- 10-item, 11-point Likert Perceived Therapeutic Efficacy Scale assesses outcome expectancy for:
  - Exercise and Arthritis
  - Exercise and HBP

Statistical Analyses

- Repeated measures modeling will be used to investigate the relationship of randomized group assignment (independent variable) with the
  - Primary outcomes
  - Secondary outcomes
  - Mediators
- Level of significance set to .05

Statistical Analyses

- To explore the extent to which self-efficacy and outcome expectancy mediate the relationship between the STAR intervention and performance of lower extremity exercise and participation in fitness walking, correlational or linear regression analyses between the possible mediators and the outcomes will be performed at each of the three time points

Subjects (N = 107)

Characteristic	Results
Age in years, M (SD, range)	65 (8, 51-84)
Female, n (%)	78 (73)
Race, n (%) White Black Asian	 81 (76) 24 (22) 2 (2)
More than high school education, n (%)	81 (77)
Married, n (%)	45 (42)
Employed, n (%)	50 (47)
Household income < $50,000, n (%)	48 (54)

WOMAC Pain Subscale

		Most Affected Knee*		
Index Knee	**Sample**	**Right (n=38)**	**Left (n=47)**	**Both (n=22)**
Right, M (SD)	4.9 (3.8)	--	--	--
Left, M (SD)	4.8 (3.8)	--	--	--
Both Knees, M (SD)	4.9 (3.3)	5.1 (3.3)	4.2 (3.3)	5.8 (3.2)
*p = .176				

SF-36 Bodily Pain Subscale

Mean (Norm)	SD (Norm)	Range
57.8 (50.0)	20.5 (10.0)	0.0-100.0

Arthritis Self-Efficacy Subscale: Pain

Mean	SD	Range
73.4	16.4	24-100

Relationship Between Arthritis Self-Efficacy for Pain Management and Pain

	WOMAC Pain: Both Knees	SF-36 Bodily Pain
Self-Efficacy: Pain	r = -.174 (p = .073)	r = .293 (p = .002)

Conclusions

- At baseline, community dwelling older adults with OAK and HBP in a clinical trial promoting PA have mild knee pain and average bodily pain
- At baseline, arthritis self-efficacy for pain management is related to less pain, which is consistent with self-efficacy theory
- If successful, the STAR intervention will be ready for translation to clinical practice

Thank you.
Are there any questions?