March 18, 2010

Research Consortium Scholar Lecture: Off the Couch and Into the Gym—Women and Physical Activity

Lynda B Ransdell, Boise State University

Available at: https://works.bepress.com/lynda_ransdell/12/
From Jane Fonda to Jillian Michaels: Off the Couch and Into the Gym—
Physical Activity and Women
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Primary Purposes of Presentation

• Summarize key recommendations for increasing PA in women across the age spectrum
• Illustrate the use of strategies to increase PA in women across the age spectrum with DAMET, GET FIT and Masters Athletes studies as examples
• Present recommendations for future research
Additional Purposes of This Presentation

• To discuss the thought processes that went into my own research agenda
  – To help budding scholars
• To THANK individuals who have helped me along the way
  – Because no woman is an island!

The Problem...

• American’s are inactive
  – Only 3.2% met the moderate to vigorous PA recommendations when measured objectively with accelerometry
  – NHANES data (2003-2006) (n = 7674)
  – Accelerometer data present new and sobering results about LOW PA in America

Gao, Sun, & Ransdell, 2010 and Trolano et al., 2007
The Problem (Cont’d.)

• When men and women are normal weight or underweight (BMI < 25 kg·m²), they are similarly active
• OW and OB women are less active than OW and OB men
• Older individuals (60+ y) are less active than younger individuals (20-59y)—except when obese (BMI > 30 kg·m²), then they are similarly inactive

Gao, Sun, & Ransdell, 2010

A Scary Thought...

• By 2048, if our obesity rates continue to increase at the current speed, 100% of the U.S. adult population will be overweight or obese

Wang et al., 2008, Obesity, 16(10): 2323-2330
Increasing Physical Activity is a KEY Public Health Strategy to Improve the Nation’s Health and Combat the Obesity Epidemic

Experiences of Women with PA Across the Age Spectrum

Sedentary Lifestyle

- Depression
- Anxiety
- Stressed Out
- Overweight/Obese
- Hypokinetic Disease

Regularly Active Lifestyle

- Higher Self-Esteem
- Lower Unplanned Pregnancy Rate
- Normal Weight
- Lower Hypokinetic Disease Risk

Adolescent Girls

Adult Women

Older Women/Masters Athletes

- Loss of Independence
- Loss of Function
- Dementia

- Compression of Morbidity
Life Course Epidemiology

- **Family influences on PA are environmental, cultural and genetic factors**
- **Dunedin, New Zealand Longitudinal Study**
  - Measured participants at childhood & adolescence

- **Persistent Inactivity:**
  - Lower childhood family-recreation orientation, poorer fitness & general health during adolescence

- **Declining Participation:**
  - Fewer activities at home during childhood

- **Persistent Activity:**
  - Better fitness & less TV watching

Because of Different Experiences with PA, Various Recommendations are made...

- Use THEORIES and MODELS to guide your interventions
An Application of SOCIAL COGNITIVE THEORY (SCT) to a Mother-Daughter PA Intervention: The DAMET Project (CSU Phase I)

Purpose of DAMET

To provide a fun, effective, SCT-based 12 week PA intervention for mothers (< 60 y) and daughters (11-17 y) that facilitates changes in:

- Physical Activity
- Physical Fitness
- Physical Self-Perception (Self-Efficacy toward physical activity and fitness)
The Planning Process: Reciprocal Determinism (dynamic interplay of personal, behavioral, environmental constructs)

**Behavioral Factors**
- Increase Knowledge
- Improve Abilities

**Environmental Factors**
- Family
- Peers
- Female Friendly Setting

**Personal Factors**
- Self-Efficacy
- Observational Learning
- Overcoming Barriers

Selected Components of SCT and Effect Sizes from Dishman & Buckworth (1996) Used to Plan DAMET

Environment (Facilitation/Empowerment)
- Female ($r = .91$)
- Group ($r = .75$)
- Ages Combined ($r = .91$)
- Community ($r = .82$)
- Family ($r = .05$)
- Healthy Participants ($r = .75$)
- Make it FUN!!

- Newsletters, Websites & email to keep informed
- Rewards for process goals
**SCT, ES and DAMET (CONT’D.)**

**Observational Learning**
- Peer coaching
- Mom-Daughter Coaching
- Researcher-to-subject Coaching
- Sport Clinics by Athletes

**Self-Regulation**
- Behav. Contracts ($r = .92$)
- “Move Across CO”
- PA Logs
- Individual Meetings
- Relapse Prev. ($r = .92$)
- Monitor Attend. ($r = .88$)

**SCT, ES and DAMET (CONT’D.)**

**Self-Efficacy**
- Mod. to Vig. PA ($r = .94$)
- Lifetime skills (hiking, aerobics, self-defense)
- Strength training ($r = .46$)
- Set goals each week
- Basic and progressive instruction
- Role playing – dealing with barriers ($r = .92$)
- Positive self-talk ($r = .10$)
- Mental imagery ($r = .10$)
Pilot DAMET: Round 1 (CSU)

Ransdell et al. (2003). *Women & Health*

N = 20

12-Wk Intervention: Met twice/week
(May - August)

**Pre-Test & Focus Grp.**

**Post-Test**

**Physiological Variables:**
- $V_{O2\text{peak}}$
- BMI

**Physical Activity (d/wk)**

**Qualitative Interview Data**

**Psychological Variables:**
- PSPP Sub-Scales (5)
- Sports Competence
- Strength/Muscularity
- Physical Condition
- Attractive Body
- Physical Competence

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**Physical Activities**
- 1-day / week
- Ropes Course
- Urban Orienteering
- White Water Rafting
- Indoor Rock Climbing
- Aqua Aerobics
- Step/Box Aerobics
- Golf
- Hiking
- Frisbee Golf
- Sport Clinics by Athletes

**Classroom Activities**
- 1 day / week
- Intro Games
- How much PA?
- Calculating EE
- Components of HRF
- Goal Setting
- Move Across CO
- Using Logs
- Busting Barriers
- Computer Diet Analysis
- Fitness Trivia
Results
No Change in PA Participation (d/wk) Over Time (Pre- to Post)

<table>
<thead>
<tr>
<th></th>
<th>Pre-Test</th>
<th>Post-Test</th>
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</thead>
<tbody>
<tr>
<td>Moms</td>
<td>3.2 ± .73</td>
<td>3.4 ± .53</td>
</tr>
<tr>
<td>Daughters</td>
<td>2.6 ± .73</td>
<td>3.6 ± .50</td>
</tr>
</tbody>
</table>

ES (Eta-Squared) = .12 (small ES)

Results (Cont’d.)

- 3 of 5 PSPP Sub-Scales Improved Over Time: Sport Competence, Strength and Muscularity, and Physical Condition
  - ES = 0.48 - 0.57
- No Change in Attractive Body & Physical Competence Sub-Scales
- No Changes in Physiological Measures (BMI, VO\textsubscript{2peak})
- Qualitative Data: Most positive aspect of program was mother/daughter bonding
DAMET—Phase II: Utah Version

- Compare home-based (HB) to university-based (UB) programs \( (n = 34) \)
- More days of activity to facilitate improvements in fitness
  > from 1 to 3 d/wk)
- Lower activity at baseline
- More tests of fitness
- Quantitative measure of Family Bonding

DAMET: Part 2 (Utah)

12-Week Program (January - April)
Compare University-Based and Home-Based Groups

Pre-Test → 12-week post-testing

Physiological Variables
- \% BF
- Estimated VO\(_{2\text{max}}\)
- Flexibility
- Push-Ups
- Sit-Ups

Psychological Variables
- Physical Self-Perception
- Family Bonding
- Exercise Benefit to Barrier Scale

Physical Activity
Qualitative Feedback
### University-Based Group
- 4 classroom sessions
- 2 days/week for fitness (30 mins. wts + 30 mins. aerobic)
- 1 day/week for fun lifetime activity: indoor rock climbing, racquetball, soccer, volleyball, basketball, box aerobics, x-c skiing, snowshoeing, self-defense, orienteering
- Additional lifetime PA

### Home-Based Group
- Pre-intervention training on activities & classroom material
- Written handouts
- Website information
- Self-selected activities
- 2-4 days/week of activity
- Progressive increases in weights lifted and length of aerobic activity

### 12-Week Results for Moms

**Fitness & Activity**
- Push Up Scores > in Both Groups
- Sit Up Scores > in Both Groups
- Flexibility > in Both Groups
- Aerobic Fitness > in Both Groups
- Diastolic BP < in Both Groups
- NS changes in weight, % BF
- Days / Week of PA > Both Groups (Aerobic, Muscular Strength, Flexibility)

**Psychological**
- NS changes in PSPP Sub-Scales
- Barriers decreased (ES = .41)
- Largest benefit = life enhancement (sleep, alertness, self-concept)
- Family Relations Improved in 80% of Dyads
12-Week Results for Daughters

**Fitness and Activity**
- **Sit Up Scores** > in Both Groups
- **Days / Week of PA** > in Both Groups (Aerobic, Muscular Strength, Flexibility)
- NS changes in Push-Ups, Weight (lbs), % BF, BP, Flexibility, Predicted VO$_2$max

**Psychological**
- **Sports Competence** > in Both Groups
- **Attractive Body** > in Both Groups
- NC in benefits/barriers
- 80% daughters said family relations improved w/ participation in DAMET

Conclusions from DAMET (Part 2)
- HB may be as effective as UB for increasing PA & fitness and improving psychological predictors of PA in mothers and daughters
- Mother-daughter relationship improves
- High adherence rates (Utah?)
- All UB participants wanted to continue beyond 12 weeks
Phase III: Generations Exercising Together (GET FIT-Utah) (Ransdell et al., 2005)

- Definition of Family Expanded to 3 Generations
- Length of Intervention Increased (4 to 6 mos.)
- Increased Number of HRF Components Tested
- Added Objective Measure of PA (pedometer)
- Examined Changes in Bone Density

Generations Exercising Together (GET FIT)—Phase III (Ransdell et al., 2005)

6 month program comparing home-based program to wait-list control condition (n = 36)
- Daughters = pre-menarcheal (8-13 yrs)
- Mothers = normal menstrual status (30-50 yrs)
- Grandmothers = post-menopausal (50-70 yrs)
Desired Behavior Changes

**Health-Related Fitness:**
- 1 mile walk
- Push-up test
- Abdominal crunch
- Sit-and-reach test
- Body composition (BIA)
- Body mass (kg)

Desired Behavior Changes

**Self-reported Physical Activity (subjective)**
- Days/week of aerobic, resistance, flexibility training

**Physical Activity (objective)**
- Pedometer step count (steps/d) for 3 days
Results

Compared to participants in the CG, participants in the HB group significantly increased their steps/day
Compared to participants in the CG, participants in the HB group significantly increased their participation in flexibility exercises (d/wk)
Effect sizes for all changes were medium to large

What About Masters Athletes?

• Ideal for the study of optimal aging
  – Resist negative stereotypes associated with aging
  – Present an image that is powerful, vital, and active (vs. passive, disabled, and dependent)

(Dionigi, 2006)
What is a Masters Athlete?

**Depends on the Sport...**

- **21 and older**: diving, skiing, swimming, synchronized swimming
- **30 and older**: cycling, ice hockey, judo, luge, soccer, volleyball, water polo
- **35 and older**: badminton, canoe/kayak, softball, tennis, track & field, weight lifting
- **Over 40**: archery, curling, fencing, sailing, shooting

(Ransdell, Vener & Huberty, 2010)

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**Percent Difference Calculations in Running, Swimming, Cycling**

**Age-Related Difference**

\[
\text{Age group record} - \text{Criterion record} \times \frac{\text{Criterion record}}{100}
\]

**Gender-Related Difference**

\[
\text{Women’s record} - \text{Men’s record} \times \frac{\text{Men’s record}}{100}
\]

NOTES: In 1973, King was 29 y and Riggs was 55 y; Percent Difference Calculation Methods adapted from Ransdell & Wells, 1998 and 1999
Masters Athletes

- Performance in women declined faster in running than in swimming or cycling
  - BUT consistent decline occurred after age 50 y
  - More pounding and “wear-and-tear” and injuries with running
  - Percent body fat effects running more than swimming

(Ransdell et al. (2010) J Exerc Sci Fit, 7(2 Suppl): S61-S73)

Physiological Factors

**Anaerobic Performance**

- Speed/Power (Tanaka, 2010)
  - Reaction time
  - Muscle size & strength
  - Fewer Type II muscle fibers
  - Less maximal and rapid force generating capacity of involved muscles
    - Stride Length

30% decline in arm strength

40% decline in leg & back strength

Helen Zechmeister, 81 y (Wt Lifting)
(From: http://ettaclarkphotography.com)
Physiological Factors (Cont’d.)

**Aerobic Performance**
- VO\(_{2\text{max}}\)
- Aerobic capacity
  - ↑ body fat and ↓ muscle mass (explains 35%)
- Cardiac Contractility
- Maximal heart rate
- Mitochondria quality
- Thirst Mechanism
  - Less efficient with age

10% decline per decade in sedentary
5-7% per decade in active people
BUT LOSS IS NOT LINEAR
- slow decline in young adulthood
- accelerates in middle age
THEN, dramatic decline


Psychological Factors

- Depression with decline in physical function
  (Gallo et al., 2003; Karim & Burns, 2003)
- Less intrinsic drive to train
  - Other responsibilities in life become more important
    (Korhonen et al., 2009; Reaburn & Dascombe, 2008)
- Changes in training habits
  (Korhonen et al., 2009; Reaburn & Dascombe, 2008; Spirduso et al., 2005)
  - Fewer hours of training
  - More cross-training
  - Less time spent on speed and strength training
So, Let’s Summarize The Recommendations For Increasing PA Across the Age Spectrum...

Recommendations for Adolescent Girls

- Trial of Activity for Adolescent Girls (TAAG)
  (Pate, Ward, Sallis, Elder, Young, Simons-Morton, Stone, et al.)

Table 2: Hypothesized girl-level mediators and moderators measured in TAAG

<table>
<thead>
<tr>
<th>Mediators</th>
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<tbody>
<tr>
<td>• girls’ perceptions of their self-efficacy related to being active</td>
</tr>
<tr>
<td>• the degree to which girls enjoy being active and participating in physical education class</td>
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<tr>
<td>• girls’ perceived benefits of and barriers to being active</td>
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<tr>
<td>• girls’ perception of social support and a positive school climate for being active</td>
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<tr>
<td>• girls’ perception of available environmental and recreational facilities</td>
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<tr>
<td>• girls’ perception of the school climate for physical activity</td>
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<table>
<thead>
<tr>
<th>Moderators</th>
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</thead>
<tbody>
<tr>
<td>• body composition</td>
</tr>
<tr>
<td>• exercise and activity history</td>
</tr>
<tr>
<td>• amount of time spent at home alone</td>
</tr>
<tr>
<td>• efficacy</td>
</tr>
<tr>
<td>• socioeconomic status</td>
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</tbody>
</table>
Recommendations for Adolescent Girls (Cont’d.)

- Organized activities work better than recess (unorganized) activities (Bengoechea et al., 2010)
- Variety of activities from which to choose
- Facilitate bonding— with peers, families (Ransdell et al.)

Recommendations for Increasing PA in Adult Women (Ransdell, Dinger, Huberty, & Miller, 2009)

- Increase self-efficacy, activity enjoyment, and social support
- Offer co-ed and single-sex opportunities for activity
- Offer moderate and vigorous activities
- Recommend 10 minutes
  - 10 min rule and 10 min bouts
- Provide contact with a fitness professional
Recommendations for Increasing PA in Adult Women (Cont’d.) (Ransdell, Dinger, Huberty, & Miller, 2009)

• Think PROGRESSIVE
  – Skill development
  – Intensity
• Find Role Models
• Set Process Goals
• Use Self-Monitoring (goal setting, logs, pedometers, etc.)
• Teach Positive Self-Talk
• Minimize Focus on Weight Loss

More Recommendations for Adult Women ...(Ransdell, Dinger, Huberty, & Miller, 2009)

• PROMOTE: Sweat is Sexy
• Improve Neighborhood Safety
• Provide Child Care
• Provide Alternatives to Typical Gym Workout (Home-Based, Multi-Task)
• Provide Culturally Appropriate Activities
Recommendations For Older Women: What Constitutes Health Aging?

<table>
<thead>
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<tbody>
<tr>
<td>Health</td>
<td>Health</td>
<td>Health</td>
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<tr>
<td>Happiness</td>
<td>Satisfaction</td>
<td>Wellness</td>
</tr>
<tr>
<td>Mental Capacity</td>
<td>Staying Physically Active</td>
<td>Engagement/Stimulation</td>
</tr>
<tr>
<td>Life Satisfaction</td>
<td>Positive Attitude</td>
<td>Physical Activity</td>
</tr>
<tr>
<td><strong>Physical Activity</strong></td>
<td>Family</td>
<td>Security/Stability</td>
</tr>
<tr>
<td>Close Personal Relationships</td>
<td>Independence</td>
<td>Attitude</td>
</tr>
<tr>
<td>Social Activity</td>
<td>Acceptance</td>
<td>Adaptation</td>
</tr>
<tr>
<td>Sense of Purpose</td>
<td>Moderation</td>
<td></td>
</tr>
</tbody>
</table>

From Weir (Chapter 10) in Baker, Horton, & Weir (Eds), 2010

Recommendations for Older Women
(McAuley, King, Gibson)

- **Consider Safety**
  - Environment
  - Equipment
  - Instructors
  - Screening
  - Lower Intensity
  - Health Care Provider Referral
- **Make it Convenient & Inexpensive**
- Minimize Pain
- Maximize Self-Efficacy
Recommendations for Continued Healthy Participation for Masters Athletes...

- Accept some aspects of the aging process
  - Performance WILL decline
  - You can play a role in HOW MUCH it will decline by continuing with some hard training
- Focus on QUALITY of training rather than QUANTITY
- Listen to your body (i.e., Recovery is as important as training)
- Don’t stop resistance training
- Eat less and eat nutrient dense foods
- Drink more than your thirst mechanism dictates

Make it FUN!!
(so you will keep wanting to do it)
### Comparison of Strategies to Increase PA in Women Across Age Groups

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Adolescent Girls</th>
<th>Adult Women</th>
<th>Older Adult Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; Self-Efficacy</td>
<td>😊😊😊😊😊</td>
<td>😊😊😊😊😊</td>
<td>😊😊😊😊😊</td>
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<tr>
<td>&gt; Enjoyment of PA</td>
<td>😊😊😊😊😊</td>
<td>😊😊😊😊😊</td>
<td>😊😊😊😊😊</td>
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<tr>
<td>&gt; PA Benefit to Barrier Ratio</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
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<tr>
<td>&gt; Availability of recreational facilities</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
</tr>
<tr>
<td>&gt; Social Support</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
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<tr>
<td>Use Goal Setting</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
</tr>
<tr>
<td>Use Self-Monitoring</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
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<tr>
<td>Make Environment Safe &amp; Welcoming (culturally appropriate, single-sex, childcare, progressive)</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
<td>😊😊😊</td>
</tr>
<tr>
<td>Increase Opportunities to TRY Various Activities</td>
<td>😊😊</td>
<td>😊😊</td>
<td>😊😊</td>
</tr>
<tr>
<td>Offer Moderate PA</td>
<td>😊😊</td>
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### Future Research Directions Related to Increasing PA in Girls and Women

- **Increase evidence base for predictive models**
  - Mediating and moderating variables
    - Best analysis to identify which technique resulted in change

- **Increase evidence base relative to family interventions**

Future Research Directions Related to Increasing PA in Girls and Women

• Use CONSORT Checklist to Ensure that Published RCT Interventions Include Vital Information


The CONSORT Statement 2001 checklist is intended to be accompanied with the explanatory document that facilitates its use. For more information, visit www.consort-statement.org

• Randomization procedures
• Background and explanation of rationale
• Eligibility criteria
• Details of intervention
• Objectives & Hypotheses
• Outcome measures
• Power calculation
• Whether or not participants and researchers were blinded to grp asnt.
• Stat methods and subgroup analyses
• Participant flow through each stage
• Recruitment/follow-up
• Baseline demographics
• Number of participants
• Summary of results and effect sizes & confidence intervals
• Adverse effects
• Interpretation of results (including bias)
• Generalizability of findings

Future Directions Related to Increasing PA in Girls and Women

• Center-based programs result in better fitness outcomes
• Home-based programs have better adherence
• Can combination programs be developed that make use of best features of both?

Future Directions Related to Increasing PA in Girls and Women

- We know little about what happens to PA behavior after the intervention stops
  - Re-randomize initially successful participants into maintenance interventions
  - Develop models that lead to behavior maintenance


Future Directions Related to Increasing PA in Girls and Women

- Examine Factors Related to Successful Group Fitness Programs
  - Solidarity
  - Mutual Trust
  - Feeling of being accepted by others in the group
  - Support Homework (calling each other)

  McGonigal (2007) IDEA Fitness Journal
Thanks to....

• Dr. Christine Wells  
  – My mentor at Arizona State

• My Mom  
  – My perennial source of support!

More Thanks...

• Eastern Kentucky University Faculty (BS Degree)
• Smith College Faculty (MS Degree)
• Arizona State University Faculty (Ph.D.)
• Colleagues at Colorado State University
• Colleagues at University of Kentucky
• Colleagues at University of Utah
• Colleagues at Boise State Univ.
Thanks To: The Research Family Tree

Monique Schaal: Establishing Vertical Jump Norms for Female Collegiate Volleyball Players

Rhonna Krouse: Motivation, Goal-Oriented, Training, & Coaching, of Female Ultrarunners

Monica Reynolds: Do Idaho HS Strength Training Practices Vary Based on Gender?

Eliz Ellsworth: Revisiting the MK Staircase Test: Assessing Power in Masters Athletes

Wendy Mader: Eating & Training in ½ Ironman Comp.

Physical Activity Interventions

Jen White: Qualitative perspectives on exercise adherence in previously sedentary versus sedentary individuals

Monica Reynolds: Do Idaho HS Strength Training Practices Vary Based on Gender?

Zoe Hewett: An examination of the effectiveness of an 8-week Bikram Yoga program on mindfulness and physical fitness

Physical Activity & Sport in Girls & Women

Jen White: Qualitative perspectives on exercise adherence in previously sedentary versus sedentary individuals

Dave Jennings: Use of Resiliency Training to Facilitate Physical Activity Initiation and Adherence

Wendy Mader: Eating & Training in ½ Ironman Comp.

Lynne Ornes: An Online Intervention to Increase Physical Activity in College Students

Jessica Dratt, Darcie Oakland, Allison Taylor, Jen White (Huberty): Daughters and Mothers Exercising Together, GET FIT and UTAHFIT

Research Agenda

Major Areas of Interest

Physical Activity & Sport in Girls & Women

Physical Activity Interventions

Professional & Career Development

Completed Projects

• Sex Differences in Performance
• Masters Women Athletes
• Activity Patterns in Diverse Women
• SPA in PM women
• Syndrome X
• Maturing Female Athlete
• The Contributions of SPA and PSP to PA participation in girls & women
• NAGWS BOOK: Ensuring the health of active and athletic girls and women

Future Projects

• Physiological Norms for U.S. Olympic Hockey Team
• Modified Test of Power in Masters Athletes
• Testing Norms for Female athletes (300 yd shuttle)
• Strength Training programs in Idaho High Schools

• DAMET Projects
• GET FIT Project
• University-Based PA Programs
• Church-Based Health Promotion
• Integrated Health & PE Curricula
• Pedometers & PA
• HK BOOK: Developing effective physical activity programs

• Senior Faculty & Mentoring
• Preparing Future Faculty
• Women & Leadership
• Increasing Publication Productivity
• Faculty Re-investment in teaching

??????
Book of Interest

**ENSURING THE HEALTH OF ACTIVE AND ATHLETIC GIRLS AND WOMEN**

LYNDA RANSDELL & LINDA PETLICKOFF

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Thanks for Your Attention!