Activity Trackers 101

Carol Kennedy-Armbruster, PhD
IUB School of Public Health
Department of Kinesiology
Objectives for Webinar

- Why activity trackers (AT’s) are useful, and how they work.
- Research on AT’s wear-ability and behavioral changes.
- Data discovered through IU's own "Ready to Move" student-coaching program.
- Healthy IU programs to assist with AT usage
Healthy IU Opportunities

Feel Great IU 5% Weight Loss or Maintenance Challenge

- **12-week challenge** begins January 25!
- For **full-time faculty/staff.** Spouses/partners on an IU-sponsored health plan are welcome to join, too!
- Educational support programs such as **Weight Watchers** are offered only to challenge participants!
- **Fitbit Flex** incentive for eligible participants upon completion of challenge and a post-challenge survey.
- REGISTER & learn more about Fitbit incentive eligibility requirements: go.iu.edu/feel-great

Ready to Move IU & IUPUI

- IUB and IUPUI
- **Work with an IU School of Public Health student** to find creative ways to move more throughout your day!
- **Use a Fitbit Flex** provided by Healthy IU to help you track movement.
- Not personal training.
- Must be full-time faculty/staff.
- REGISTER & learn more:

Activity Tracker Online Forum

- **Starts January 11** for IUB staff and faculty
- Interact with other Activity Tracker users
- Fun content could include book discussions, mini-challenges, and more!
- Facilitated by **School of Public Health Graduate Students**
- Added bonus: Get acquainted with IU’s new operating system, Canvas.
- REGISTER & learn more:

*Please Note: Values of Fitbit Flex ($99.95) and Weight Watchers ($129) are considered taxable income and will be reported on box one of the IU employee’s W-2.

REGISTRATION FOR 2016 SPRING SEMESTER PROGRAMMING IS NOW OPEN!
SEE WHAT’S BEING OFFERED ON YOUR CAMPUS. VISIT healthy.iu.edu
# State of Well Being

## Gallup-Healthways Well-Being Index

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Percentage</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thriving</td>
<td>52.6%</td>
<td>+1.1</td>
</tr>
<tr>
<td>Struggling</td>
<td>43.5%</td>
<td>-0.9</td>
</tr>
<tr>
<td>Suffering</td>
<td>3.9%</td>
<td>-0.2</td>
</tr>
<tr>
<td>Happiness</td>
<td>48%</td>
<td>-</td>
</tr>
<tr>
<td>Stress</td>
<td>11%</td>
<td>-</td>
</tr>
<tr>
<td>Uninsured</td>
<td>15.6%</td>
<td>-1.6</td>
</tr>
<tr>
<td>Obese</td>
<td>27.7%</td>
<td>+1.0</td>
</tr>
</tbody>
</table>

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## The State of Public Health

America's Health Rankings tracks versions of health indicators, including obesity, smoking, diabetes, and sedentary lifestyle, and assigns an overall health value to each state. Indiana is steadily slipping toward the bottom. When tracking started in 1990, Indiana ranked 30th. By 2011, Indiana has slipped to 37th, and in 2012 41st.

- **TOP 10**
  1. VERMONT
  2. HAWAII
  3. NEW HAMPSHIRE
  4. MASSACHUSETTS
  5. MINNESOTA
  6. CONNECTICUT
  7. UTAH
  8. NEW JERSEY
  9. MAINE
  10. RHODE ISLAND

- **BOTTOM 10**
  41. INDIANA
  42. MISSOURI
  43. OKLAHOMA
  44. KENTUCKY
  45. ALABAMA
  46. SOUTH CAROLINA
  47. WEST VIRGINIA
  48. ARKANSAS
  49. LOUISIANA
  49. MISSISSIPPI

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Human Movement Patterns

Exercise
- Examples: Running, Cycling, Swimming - ACSM

Physical Activity
- Daily PA such as walking to work or walking the dog – CDC

Sedentary Living
- Sitting too much throughout the day - ?
Intentional Exercise vs. Lifestyle Movement

Theoretical Patterns of Physical Activity

Too busy to move?

Research shows that bouts < 10 min, multiple times a day:

- Impact cardiovascular health
- Improve systolic blood pressure
- Decrease hypertension
- Decrease stress
- Add stairs: increase HDL and VO2


Think Differently “Don’t Steal my Steps”

Walking the dog????

Healthy Inventions????
How do AT’s work?
What’s an accelerometer?

http://www.wsj.com/articles/review-best-fitness-trackers-to-get-you-up-off-the-couch-1418760813
Who’s wearing them?

1 in 10 Americans over 18 now owns an activity tracker

Source: Inside Wearables, Endeavour Partners, 2014
% of activity tracker owners
% of U.S. population

Age group

Source: Inside Wearables, Endeavour Partners, 2014
How long do they wear them?

http://endeavourpartners.net/

http://healthy.iu.edu
Declining Rate of Sustained Use

*Declining Rate of Sustained Activity Tracker Use Over Ownership*

Source: Inside Wearable’s, Endeavour Partners, 2014
Why Behavioral research vs. Traditional research?

Table 2. Comparison of steps taken measured using hand counting compared to steps taken from the activity devices. 20 subjects; average age 21.5 – 2 - 50 min. sessions – portable metabolic analyzer

<table>
<thead>
<tr>
<th>Devices</th>
<th>Treadmill Walking</th>
<th>Treadmill Running</th>
<th>Elliptical</th>
<th>Agility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual Count</td>
<td>2425±177.9</td>
<td>3182±173.9</td>
<td>2631±371.5</td>
<td>805±51.9</td>
</tr>
<tr>
<td>Jawbone UP</td>
<td>2403±176.6</td>
<td>3186±171.5</td>
<td>2627±359.0</td>
<td>783±110.1</td>
</tr>
<tr>
<td>Up24?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nike Fuelband</td>
<td>2273±154.8*</td>
<td>3169±171.2</td>
<td>2580±458.7</td>
<td>533±70.4*</td>
</tr>
<tr>
<td>Purchase socks?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitbit Ultra</td>
<td>2425±177.2</td>
<td>2990±313.0*</td>
<td>2630±370.6</td>
<td>645±90.0*</td>
</tr>
<tr>
<td>Clip on Pedometer</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NL-2000i pedometer</td>
<td>2425±178.0</td>
<td>2869±247.1*</td>
<td>2477±471.1*</td>
<td>671±106.9*</td>
</tr>
</tbody>
</table>

Values represent means ± standard deviation.

*Significantly different than actual steps (p<.05).

Stackpool graduate thesis 2013- UW Lacrosse – John Porcari, PhD
Fitbit Flex

- $99.95
- Step tracker
- Sleep quality
- Food tracking
- Shows daily progress
- Silent wake alarm
- Syncs wirelessly via Bluetooth
Fitbit/Jawbone – AT’s recognized as the #1 fitness trend by ACSM in 2016
Apple Watch

A smarter way to look at fitness.

Apple Watch gives you a complete picture of your all-day activity. The three rings of the Activity app show your daily progress and help motivate you to sit less, move more, and get some exercise. It's also an advanced sports watch, giving you real-time stats for a variety of the most popular workouts. Over time, Apple Watch learns your activity and fitness levels. It uses that information to improve the accuracy of your measurements and suggest personalized all-day activity goals. It even provides custom reminders to encourage you to achieve them.

Learn more about Health and Fitness >
Activity Trackers in the medical setting

Studies on fitness activity trackers to monitor and promote functional recovery in patients suggest collecting up-to-date performance data could help patients:

- Regain functional independence
- Help hospitals determine the appropriate length of stay for a patient

What about standing desks?

Example of standing desk

Physiology of standing vs. sitting

- Introduction of standing workstations reduced sitting time at work
- Decreased HDL cholesterol and fasting glucose over a 3 wk. period
- Difference in energy expenditure between sitting and standing is minimal; there are positive health effects due to the increased muscular contractions associated with standing

What Happens While You Sit

- Electrical activity in your muscles drop
- Calorie burning rate immediately plunges to about 1 kcal/minute
- Insulin effectiveness drops
- Enzymes responsible for breaking down lipids and triglycerides plunge
- HDL (good cholesterol) falls

Increased standing time improved survival rate
Katzmarzyk, MSSE, 46:5, 940-946 (2014)
Healthy IU Clients - 6 semesters
Fall 2013 through Fall 2015
IUPUI Fall 2014 and Fall 2015

136 - Student coaches
174 Clients (148 Women and 26 Men)

IU Employee Rank:
91 – Staff Appointment/Professional
83 - Academic Appointment/Faculty
How Techy are we at IU?

On a scale of 1 to 10 with 1 being use a lot and 10 being do not use; how would you rate your overall experience using technology devices?

<table>
<thead>
<tr>
<th>High level of experience</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>No experience 10</th>
</tr>
</thead>
</table>

Average for this questions after 8 semesters of data: 4 out of 10
How do you envision your tracking device helping you?

- Motivator/accountability: 52
- Feedback/awareness: 43
- Track progress: 35
- Increase activity/reminder to move: 20
- Set/meet goals: 12
- No expectations: 9
- Competitiveness: 2
Post Intervention: What did you like about the device?

- Motivator/accountability: 25
- Sleep tracking: 15
- Step tracking/activity patterns: 20
- Ease/convenience: 18
- Personal data/feedback: 12
- Set/meet goals: 9
- Social aspect/comradery: 17
- Awareness: 25
- Non-invasive: 3
- Comfort/durability: 6
The Power of Connections

• Good social connections add 3,285 days (9 years) to your life expectancy
• Positive social relations improve health behaviors and health
• 2/3 increase in probability of successful behavior change
• People with close social ties are less likely to die from any cause 10 to 15 years later
How fatigued do you feel during a typical workday?
Pre/Post data Ready to Move Program

<table>
<thead>
<tr>
<th></th>
<th>Pre Average</th>
<th>Post Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extremely</td>
<td>0</td>
<td>1.8</td>
</tr>
<tr>
<td>Very</td>
<td>14.6</td>
<td>5</td>
</tr>
<tr>
<td>Somewhat</td>
<td>35.6</td>
<td>38</td>
</tr>
<tr>
<td>Slightly</td>
<td>23</td>
<td>39.8</td>
</tr>
<tr>
<td>Not</td>
<td>9.8</td>
<td>15.2</td>
</tr>
</tbody>
</table>
In a typical workday what percentage of the time are you at various levels of energy?

<table>
<thead>
<tr>
<th>% change</th>
<th>Best</th>
<th>Avg</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>IUPUI Fa 14</td>
<td>+9</td>
<td>+2</td>
<td>-12</td>
</tr>
<tr>
<td>IUPUI Sp 15</td>
<td>+13</td>
<td>-18</td>
<td>-5</td>
</tr>
<tr>
<td>IUPUI Fa 15</td>
<td>-4.9</td>
<td>-27.6</td>
<td>-6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>% change</th>
<th>Best</th>
<th>Avg</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>IUB Sp14</td>
<td>+5.1</td>
<td>-2.1</td>
<td>-3</td>
</tr>
<tr>
<td>IUB Fa14</td>
<td>+4.8</td>
<td>-3.6</td>
<td>-1.2</td>
</tr>
<tr>
<td>IUB Sp15</td>
<td>+3.8</td>
<td>-12.1</td>
<td>-3.8</td>
</tr>
<tr>
<td>IUB Fa15</td>
<td>+15</td>
<td>-16.6</td>
<td>+2</td>
</tr>
</tbody>
</table>
THINK differently
Behavioral Research

- People who walked solved more analogies
- After people walked and then sat; they thought better

Figure 4. Mean number of high-quality and high-quality novel analogies by condition. Quality analogies refer to the full height of the bar, whereas novel refers to the subset that was unique to the sample. Error bars are standard errors of the mean.


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My confidence in my ability to reach and sustain regular physical activity/movement

<table>
<thead>
<tr>
<th></th>
<th>Pre Survey</th>
<th>Post Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>IUB Fa14</td>
<td>7.69</td>
<td>8.13</td>
</tr>
<tr>
<td>IUPUI Fa14</td>
<td>8.0</td>
<td>8.14</td>
</tr>
<tr>
<td>IUB Sp15</td>
<td>*6.86</td>
<td>8.43</td>
</tr>
<tr>
<td>IUPUI Sp15</td>
<td>*7.64</td>
<td>8.25</td>
</tr>
<tr>
<td>IUB Fa15</td>
<td>6.67</td>
<td>7.5</td>
</tr>
<tr>
<td>IUPUI Fa15</td>
<td>7.10</td>
<td>7.27</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre and post combined average</td>
<td>7.32</td>
<td>7.95</td>
</tr>
</tbody>
</table>

*Note marketing changes
Sitting Time

What amount of time do you spend sitting during the course of most days of the week? % who stated approximately ¾ of the time or almost all of the time

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Average</td>
<td>81.7%</td>
<td>72%</td>
</tr>
</tbody>
</table>

When you are at work, which of the following best describes your work: % who stated mostly sitting

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Avg</td>
<td>93.6%</td>
<td>92.6%</td>
</tr>
</tbody>
</table>
My activity tracker will help me sustain a healthy lifestyle once my coaching ends:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>IUB Fall 13</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>15</td>
<td>4.52/5</td>
</tr>
<tr>
<td>IUB Spr 14</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>16</td>
<td>10</td>
<td>4.17/5</td>
</tr>
<tr>
<td>IUB Fall 14</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>11</td>
<td>13</td>
<td>4.38/5</td>
</tr>
<tr>
<td>IUPUI Fall 14</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>7</td>
<td>11</td>
<td>4.29/5</td>
</tr>
<tr>
<td>IUB Spr 15</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>10</td>
<td>16</td>
<td>4.41/5</td>
</tr>
<tr>
<td>IUPUI Spr 15</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>9</td>
<td>4.53/5</td>
</tr>
<tr>
<td>IUB Fa15</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>13</td>
<td>4.87</td>
</tr>
<tr>
<td>IUPUI Fa15</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>14</td>
<td>5</td>
<td>4.0</td>
</tr>
</tbody>
</table>
I would recommend my activity tracker to a friend

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>IUB Fall 13</td>
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<td>1</td>
<td>1</td>
<td>7</td>
<td>14</td>
<td>4.48</td>
</tr>
<tr>
<td>IUB Spr 14</td>
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<td>1</td>
<td>3</td>
<td>14</td>
<td>12</td>
<td>4.23</td>
</tr>
<tr>
<td>IUB Fall 14</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>12</td>
<td>4.12</td>
</tr>
<tr>
<td>IUPUI Fall 14</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>5</td>
<td>12</td>
<td>4.24</td>
</tr>
<tr>
<td>IUB Spr 15</td>
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<td>0</td>
<td>2</td>
<td>10</td>
<td>17</td>
<td>4.50</td>
</tr>
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<td>6</td>
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<td>4.65</td>
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<td>0</td>
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<td>2</td>
<td>13</td>
<td>4.87</td>
</tr>
<tr>
<td>IUPUI Fa15</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>12</td>
<td>9</td>
<td>4.36</td>
</tr>
</tbody>
</table>
Has the RTM program changed your views on PA? Give an example.

• **Best quotes:**
  • “It changed my view in that it actually gave me a view...of the fact I had little or no physical activity on non-workout days”
  • “Yes! That it does not only mean going to the gym and walking/running- activity can be accumulated by moving more.”
  • “Gave me awareness of my activity level, and understanding of how little movement I get throughout the day.”
  • “Yes, I'm not as worried about trying to "work out" all the time. I never could accomplish that. This is where I want to be but I see now the best way for to get there is to first just get up and move. Make it part of my normal lifestyle. That is the best way to make it an lifestyle change and not just a temporary solution.”

healthy.iu.edu
How was your day-to-day health influenced?

- Got more steps/activity: 71
- Increased awareness of activity and sleep: 52
- Setting/meeting goals: 18
- Get more/better sleep: 12
- Reminded/motivated to make healthy choices/changes: 1
- Noticed difference in energy levels: 4
What frustrated you about the activity tracker?

Charging: 22
Questions tracking accuracy/linking: 12
Putting it on/forget to wear: 17
Trouble syncing/other trouble shooting: 10
Putting it in sleep mode: 10
No digital display: 5
Not responsive without arm movements (shopping cart): 9
Nutrition information: 3
Too many components (sleep, activity, nutrition): 4
What’s the number one take-a-way from your participation in the RTM program?

- **Best quotes:**

  - “I found that I was not as active as I previously thought. The devise was proof of that. Being in this program and working with a movement coach I learned to find ways to increase my activity each day.”

  - “People want me to succeed and make changes to be more healthy and small changes and new habits others will help me get there. My student health coach, coworkers, kids, sisters are encouragers when I share with them what I want to do.”

  - “That even a 5-10 minute break to walk can drastically improve your health and ability to keep working.”

  - “I need to make me a priority and make sure I find time throughout my work day to walk.”
Have you shared you AT device with anyone else?

Have you shared your activity tracker experience with anyone else? If so, please explain:

<table>
<thead>
<tr>
<th></th>
<th>IUPUI/IUB2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family</td>
<td>49%</td>
</tr>
<tr>
<td>Friends</td>
<td>39%</td>
</tr>
<tr>
<td>Coworkers</td>
<td>22%</td>
</tr>
<tr>
<td>Other /Not Specific</td>
<td>22%</td>
</tr>
</tbody>
</table>
Paradigm Shift

FROM: Individual Factors (Personal Responsibility, Motivation, Self-Discipline)
TO: Ecological Models (Individual, Microsystem, Exosystem, Macrosystem)
Recommended Books

Dr. Levine and Dr. Segar

GET UP!

Why Your Chair is Killing You and What You Can Do About It

NO SWEAT

How the Simple Science of Motivation Can Bring You a Lifetime of Fitness

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**Healthy IU Opportunities**

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