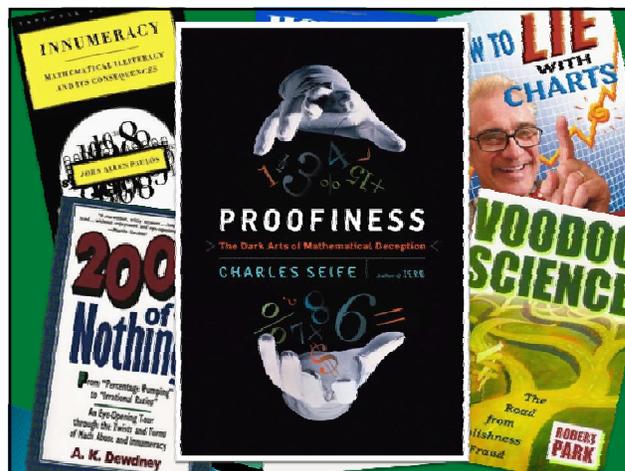


**Errors, errors, errors.  
They are everywhere!**

AAHPERD Alliance Scholar Lecture  
Boston MA  
March 2012

James R. Morrow, Jr.  
University of North Texas

**Ever gotten a speeding ticket?**

**What are your first thoughts?**

Ever wondered, "how valid are radar guns?"

Brief video of radar gun validity



**Errors we often see**

- › Standard error
- › Standard error of measurement
- › Standard error of estimate
- › Standard error of prediction
- › Standard error of the mean
- › Root mean square
- › Margin of error
- › Residual
- › Sensitivity
- › Specificity
- › Type I
- › Type II
- › Statistical
- › Interpretation

### Standard Errors

- ▶ Standard deviation
- ▶ Standard error of measurement (SEM)
- ▶ Standard error (SE)
  - Standard error of estimate (SEE)
  - Standard error of prediction (SEP)
- ▶ Standard error of the mean (SEM)
- ▶ Standard error of the difference between means
- ▶ Standard error of the correlation, percentage, etc.

### Type I and Type II Error Examples

- ▶ An error in which a relation is observed, when in fact there is none.
- ▶ A “false positive.”
- ▶ A “false negative.”

### Not all truth gets published . . . Not all published are truth

- ▶ Data in genetic study faked
- ▶ NIH finds fraud in cell paper
- ▶ Coffee linked to cholesterol rise
- ▶ Heating blood kills AIDS virus
- ▶ Cyclosporine halts growth of AIDS virus
- ▶ Children’s fitness lower than ever
- ▶ Isokinetics are better than isotonics
- ▶ Simon Newcomb’s flying machine

QUEST, 1993, 45, 52-61  
© 1993 American Academy of Physical Education

### Oh What a Tangled Web We Weave

Margaret J. Safrit  
The American University

## Some life examples

## Teaching Effectiveness

## High Stakes Testing

### Errors in teacher evaluations

	Faculty (n=32) Percent	Students (n=233) Percent
A sense of humor	3.1	14.6
Able to relate to student's lives	3.1	12.9
Patience and flexibility	6.2	21.0
Able to keep students' interest	6.2	44.2
Clearly indicates material to be tested	3.1	15.5
Uses a variety of teaching methods	40.6	24.0
A love of the subject	50.0	33.0
Outlines course expectations	21.9	10.3
Organized	43.7	12.9
Encourages student questions	21.9	6.4

Could identify four

McCabe & Layne. (Winter 2012). The Department Chair. 17-20.

### Highly effective or not?

**788**

**Effectiveness Ranges:**

Highly Effective: 783 - 838

Effective: 711 - 783

Somewhat Effective: 693 - 711

	Enrollment	Responses	Rate	Score	Range
<b>Totals and Means:</b>	96	74	77.08%	788	Highly Effective

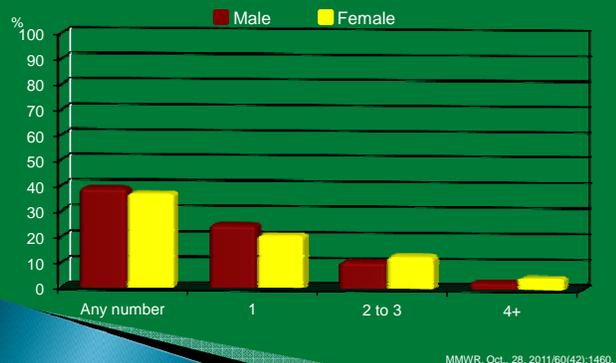
## Examples from survey questioning

How many children do you have in the home?

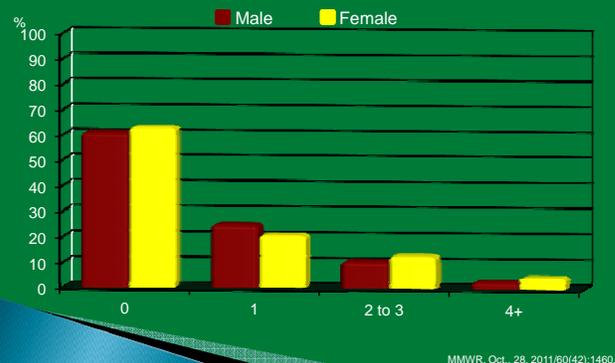
- |   |     |   |     |
|---|-----|---|-----|
| A | 0-2 | A | 0   |
| B | 3-4 | B | 1   |
| C | 5-6 | C | 2-3 |
| D | 7+  | D | 4-5 |
|   |     | E | 6+  |

Age???

Teens Aged 15-19 Who Had Opposite-Sex Sexual Partners in Past 12 Months



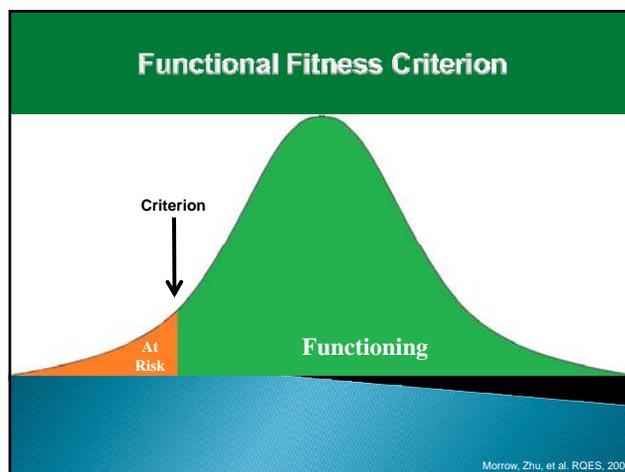
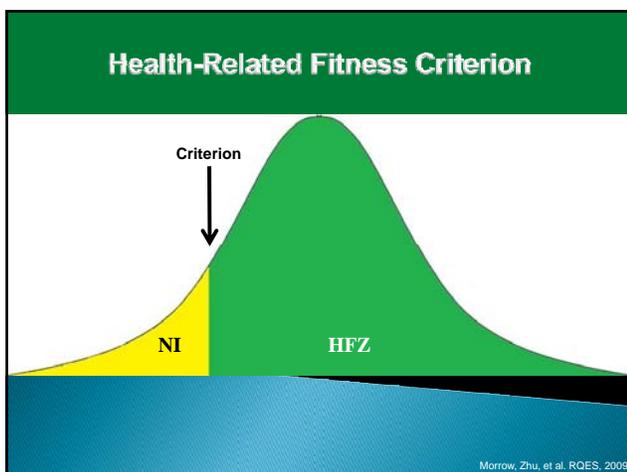
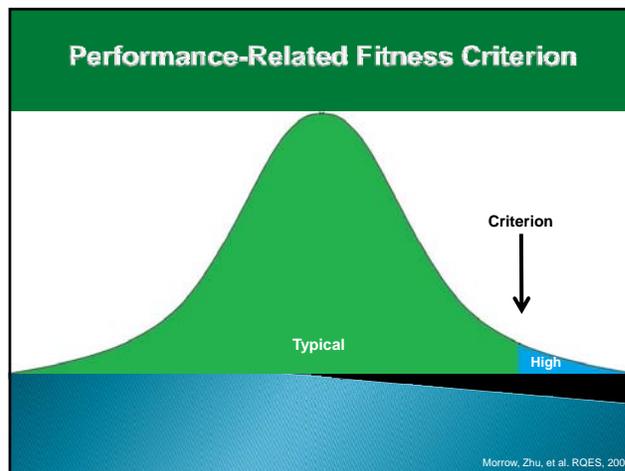
Teens Aged 15-19 Who Had Opposite-Sex Sexual Partners in Past 12 Months

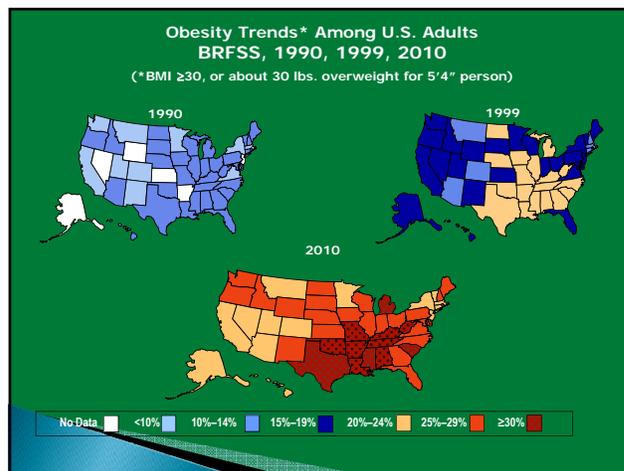
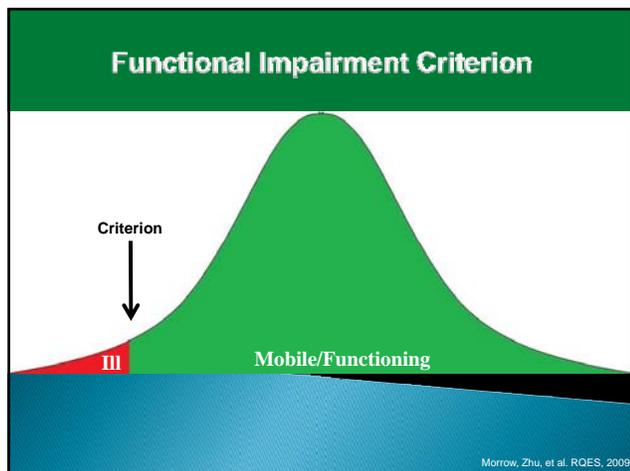


## Setting Health Criteria

<p><b>Considerations</b></p> <ul style="list-style-type: none"> <li>› Population</li> <li>› Distribution</li> <li>› Prevalence</li> <li>› Risk</li> <li>› Research</li> </ul>	<p><b>Examples</b></p> <ul style="list-style-type: none"> <li>› Blood pressure</li> <li>› Cholesterol</li> <li>› Overweight/Obesity</li> <li>› Physical Activity</li> </ul>
---	---

Estimate





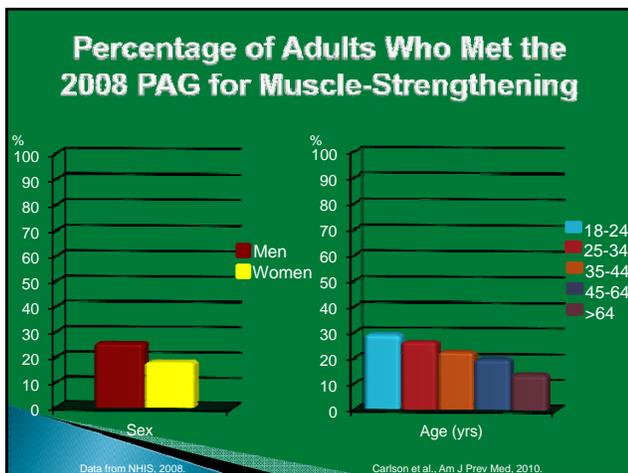
### Various body composition/obesity "errors"....

- ▶ Authors
- ▶ Formula
- ▶ Data
- ▶ Interpretation
- ▶ Costs

### Musculoskeletal Fitness

**Understudied**

**Health criterion?**



## Errors in Measurement of Physical Activity

- ### Self-report Hit and "Miss"
- Misconstrue
  - Miscount
  - Misstate
  - Misjudge
  - Misplace
  - Misprint
  - Misread
  - Misreport
  - Missay
  - Misdescribe
  - Misguide
  - Misinform
  - Misinterpret
  - Misname
  - Misrepresent
  - Mischoose
  - Mischief
  - Miscommunication
  - Misunderstand
  - Mistake
  - Mislead
  - Miscode
  - Misquote
  - Misidentify
  - Miscue
  - Mischievous
- 

### Definition Inconsistency

#### Terminology of Physical Activity, Physical Fitness, and Health

This section discusses four broad terms used frequently in this report: physical activity, exercise (or exercise training), physical fitness, and health. Also included is a glossary (Table 2-1) of more specific terms and concepts crucial to understanding the material presented in later parts of this chapter and report.

**Physical activity.** Physical activity is defined as bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above the basal level. Physical activity can be categorized in various ways, including type, intensity, and purpose.

**Physical activity**—Bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure.

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Page 21

## BRFSS PA Question 2010

During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?

Yes  
No

## Physical Activity in American Adults % meeting recommendations



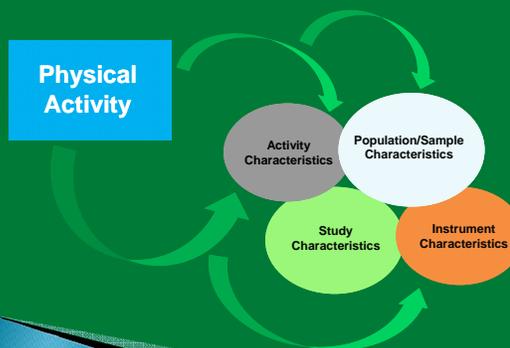
Troiano et al. MSSE, 2008; 40:181-188.

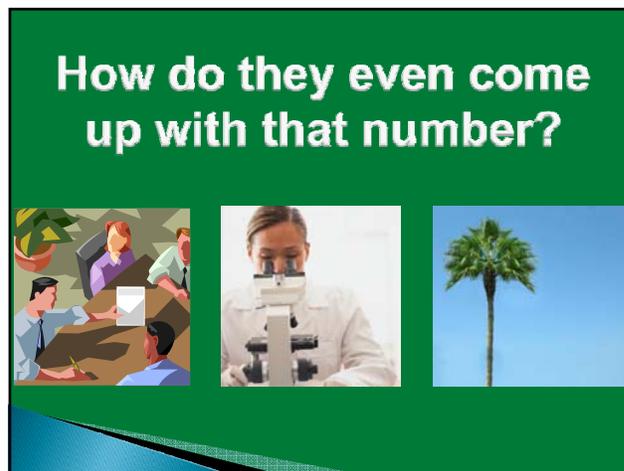
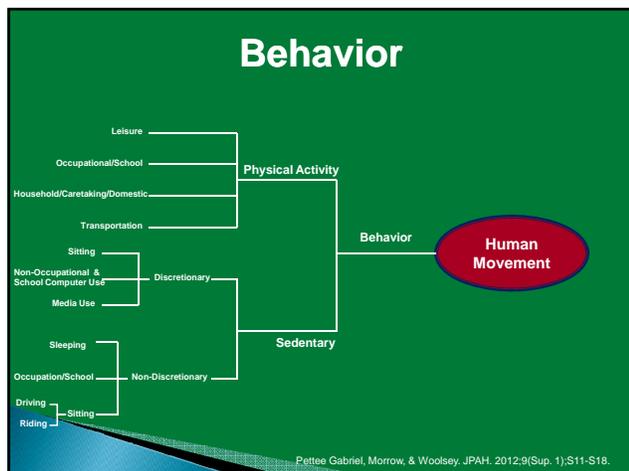
## Physical Activity Domains



Pettee Gabriel, Morrow, & Woolsey. JPAH, 2012;9(Sup. 1):S11-S18.

## Methodological Issues





## What do you think when you read this?

Health on msnbc.com

### Study: An hour of TV can shorten your life by 22 minutes

After the age of 25, watching 60 minutes of television is like smoking two cigarettes, researchers find

<http://www.msnbc.msn.com/id/44156412>

- ## Errors can be....
- |                 |                 |
|-----------------|-----------------|
| Helpful         | Aiming          |
| Harmful         | Shooting        |
| Large or small  | Writing         |
| Inconsequential | Sporting events |
| Dramatic        | Life in general |

## Reducing ERROR.....

- ▶ Be extra cautious
- ▶ Confirm
- ▶ Plan ahead
- ▶ Define
- ▶ Review
- ▶ Collaborate
- ▶ Think
- ▶ Cross validate
- ▶ Verify
  - Measurements
  - Analyses
- ▶ Check
- ▶ Recheck
- ▶ Re-recheck
- ▶ Pilot test
- ▶ Get help
- ▶ Be a skeptic

## Measurements are estimates

Good estimates?

Everything contains errors

Science-based  
Defensible  
Evolve with evidence  
Not totally static



Advance science

## Acknowledgement

- ▶ Landon T. Sibley, University of North Texas
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- ▶ Duane Knudson, Texas State University
- **Measurement and Evaluation friends and colleagues**
  - Bowles, Bray, Fulton, Glass, Hopkins, Howe, Jackson, Jackson, Mahar, Mood, Rikli, Safrit, Thomas, Zhu

Errors, errors, errors.  
Their everywhere!

Thank you!

Jim.morrow@unt.edu



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