

PHLAME A TWH™ FOR FIREFIGHTERS: OUTCOMES TO OUT THERE (LESSONS FOR TAKING SCIENCE TO SERVICE)

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Drs. Elliot and Kuehl have a financial interest in the commercial sale of technologies used in this research. This potential conflict is managed by the OHSU Conflict of Interest in Research Committee.



Where Healing, Teaching and Discovery Come Together

OBJECTIVES

- Describe the PHLAME team-centered, peer led program for TWH™ and its outcomes
- Describe findings concerning program adoption and implementation
- Explain how mediation analysis informs findings
- Share lessons learned about program dissemination

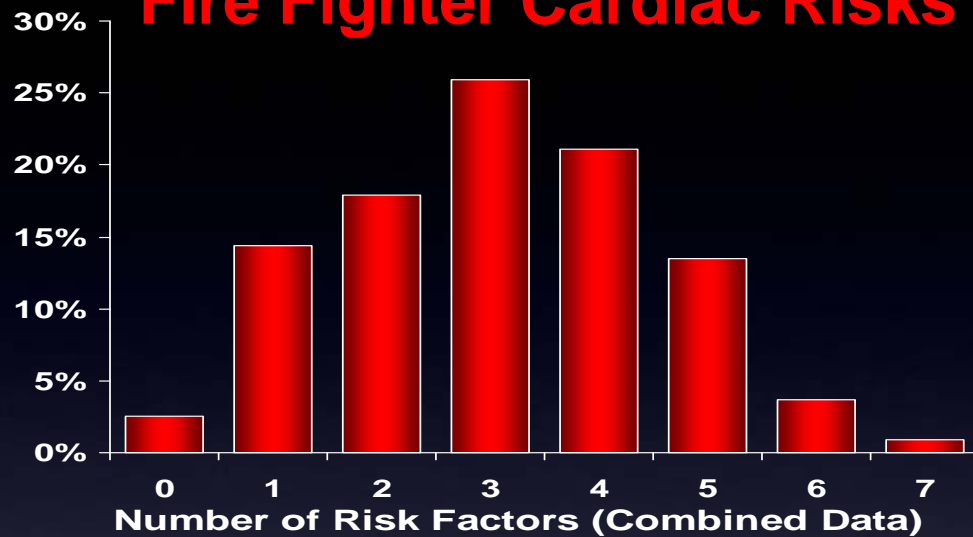
WHY PROMOTE HEALTHY BEHAVIORS?

- 1 in 5 Americans smoke
- 3 out of 4 eat unhealthy diet
- 4 out of 5 do not exercise
- 7 out of 10 are overweight
- 5 out of 10 are sleep deprived
- Human behavior accounts for >70% of healthcare costs (Institute For Healthcare Consumerism 2011)

BACKGROUND

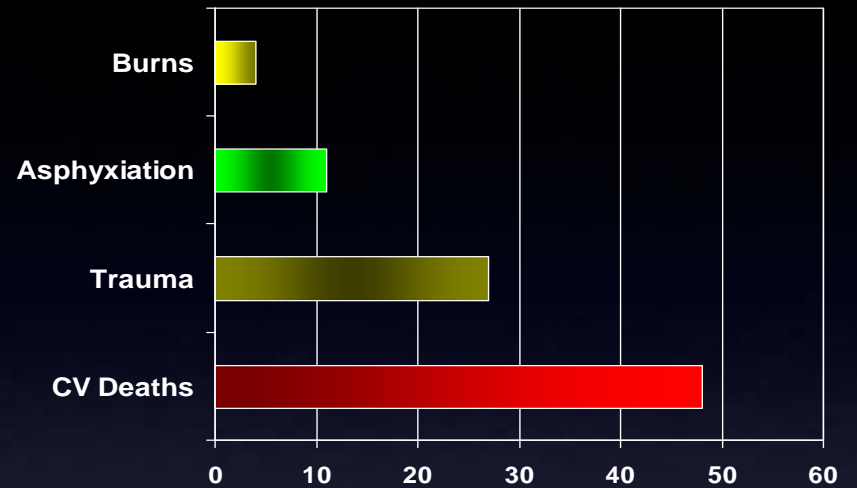
- **PHLAME Study was funded in 1999 as one of 14 grants funded by NIH to study how to change health behavior.**
- **Behavior Change Consortium was created among these researchers targeting diet, exercise, obesity, smoking, injury and illness.**
- **Objective: Conduct study to compare behavior change interventions in high risk population.**

Fire Fighter Cardiac Risks



- High LDL-cholesterol
- Low HDL-cholesterol
- Diabetes
- High blood pressure
- Less than 3d/w exercise
- Higher saturated fat diet
- Less than 5 servings F&V/d
- Overweight or obese

- 65% \geq 3 risk factors
- 40% \geq 4 risk factors



FIRE FIGHTERS & CANCER

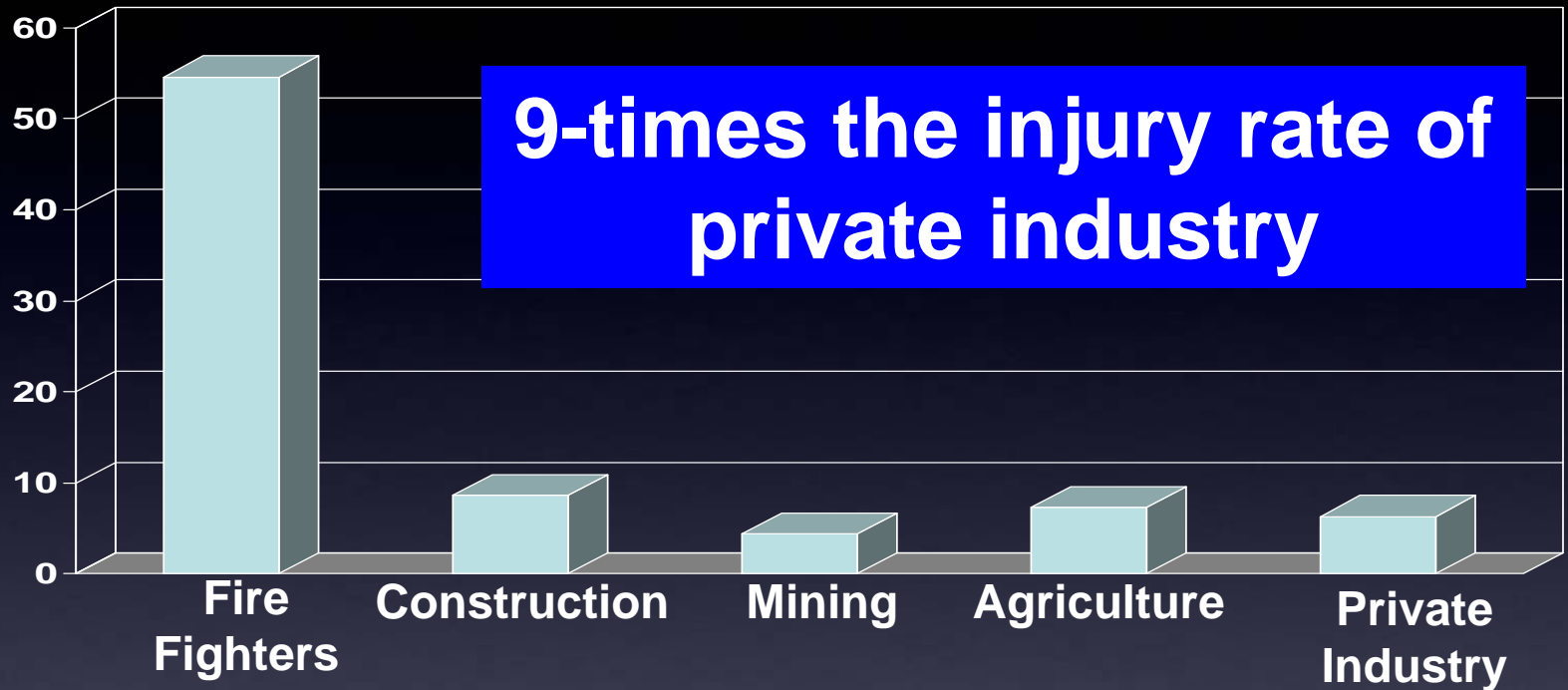
**FIREFIGHTERS ARE AT RISK FOR
EXPOSURE-RELATED CANCERS.**

Cancer Risk Among Firefighters: A Review and Meta-analysis of 32 Studies

*association with firefighting. **Conclusions:** Our results confirm previous findings of an elevated metarelative risk for multiple myeloma among firefighters. In addition, a probable association with non-Hodgkin lymphoma, prostate, and testicular cancer was demonstrated. (J Occup Environ Med. 2006;48: 1189–1202)*

SLEEP DEPRIVATION: INJURIES

Injuries
per 100
Workers



INJURIES INCREASE LATER IN SHIFT, DURING NIGHT, AND WITH LONGER HOURS.

WHY STUDY FIREFIGHTERS?

- **We demonstrated among high school athletes that team-based, peer-led behavior change programs work (ATLAS & ATHENA).**
- **Firefighting is an occupation with a natural team structure, and fire stations are a useful format for a randomized trial.**
- **Although healthy at entry, firefighters are a risk group for injury, heart disease and cancer.**



THE PHLAME STUDY DESIGN

More than 600 firefighters randomized by station
to 3 conditions



Control
(testing only)



One-one-one
coaching



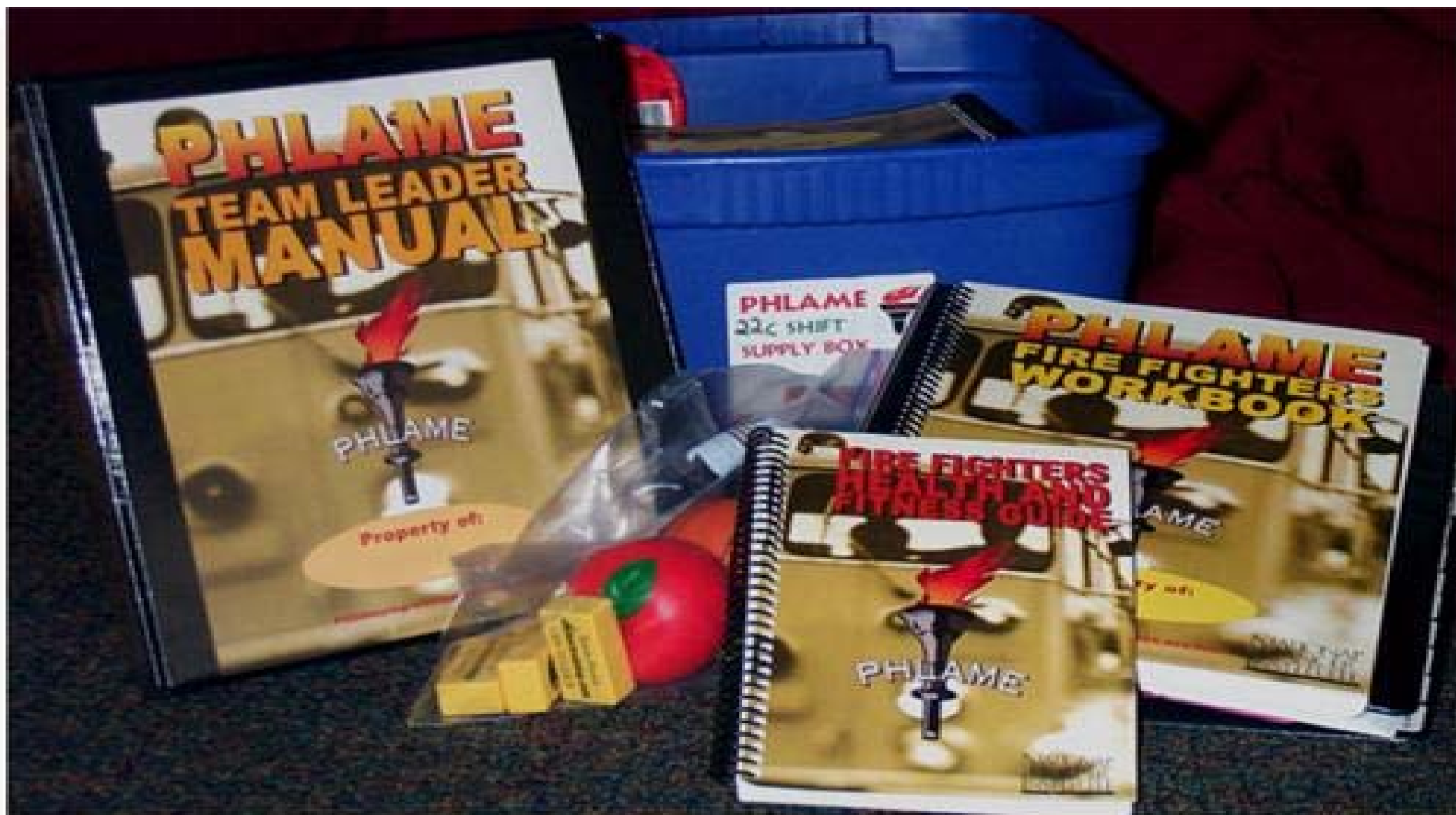
TEAM Program



ASSESSMENT ANNUALLY FOR 2 YEARS (FOLLOWED FOR 4 ADDITIONAL YEARS)

- Cardiopulmonary stress test
- Body composition analysis
- Survey





PHLAME TEAM PROGRAM

Firefighters meet once a week for 12 one-hour sessions

- **Fun learning activities**
- **Activities related to diet, exercise, body weight, injury**
- **Led by team member using scripted lesson plans**
- **Competition built in with other shifts**

ACTIVITY 2 - 10 minutes

PROTEIN IN FOODS



Instructions to Squad Leader: Read aloud the following points.



Fats Burn Slowly
Like a Candle

- ✓ Remember the torch and candle example from Session 2? Carbohydrates are the only fuel your muscles can use for intense exercise, and fats are a low octane fuel that can be stored efficiently, but can only be used for low intensity physical activities. A third nutrient from food is protein.



Carbs Burn Hot
Like a Torch

- ✓ Protein is used for muscle (and other tissues) repair and growth. Your body has no storage depot for protein, so if you are training, you will want to eat protein several times a day to provide your muscles a steady supply of protein.

- ✓ How much protein you need depends on how physically active you are. If you are doing either aerobic or strength training daily, you will need extra protein to repair muscle damage from your workouts. If you are strength training, you will need even more protein, because in addition to repairing your muscles, you need extra protein to build bigger, stronger muscles.



- ✓ Turn to the Protein in Foods table on page 112 of your Workbooks.

- ✓ Rate the grams of protein in these foods, that is guess which has the least to most amount of protein. The number of calories, % calories from fat and cost per gram of protein is provided for each food.

- ✓ We will go over the answers together when we are finished.

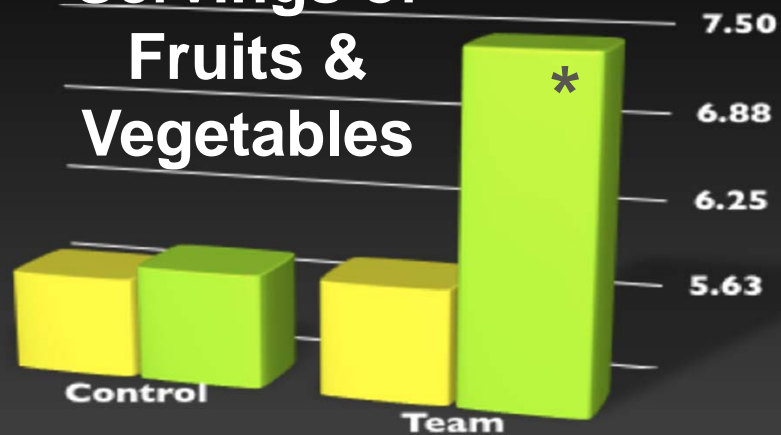
Scripted lesson plans

Minimal preparation time

Cost = \$85 per individual



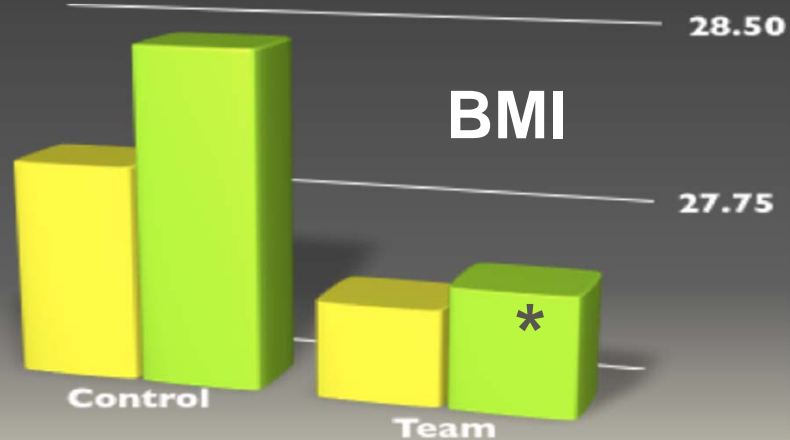
Servings of Fruits & Vegetables



Overall Well-being



BMI



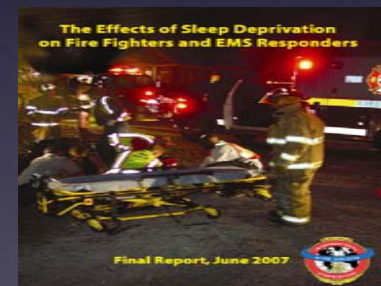
J Occup Environ Med
2007;49:204-213



WHAT ABOUT SAFETY?

- Initial NIH NIAAMS funding, so interested in musculoskeletal and back injuries in content
- Firefighters wanted additional topics, including safety topics: sleep, more injury prevention, stress management and alcohol use
- Firefighter lifestyles & sleep

<http://www.iafc.org/sleep>



HEALTH PROTECTION & HEALTH PROMOTION

- **Fatigue and injuries: most fires are afternoon to early evening but most fireground injuries are midnight to 6 AM**
- **Increasing fruit and vegetable intake may promote tissue integrity, antioxidants, anti-inflammatory properties**
 - J Internat Soc Sport Nutrition 2010;7:17.
 - Integrative Med 2010;9:25-29.
 - J Food Studies 2012;1:14-25.



LONG-TERM OUTCOMES

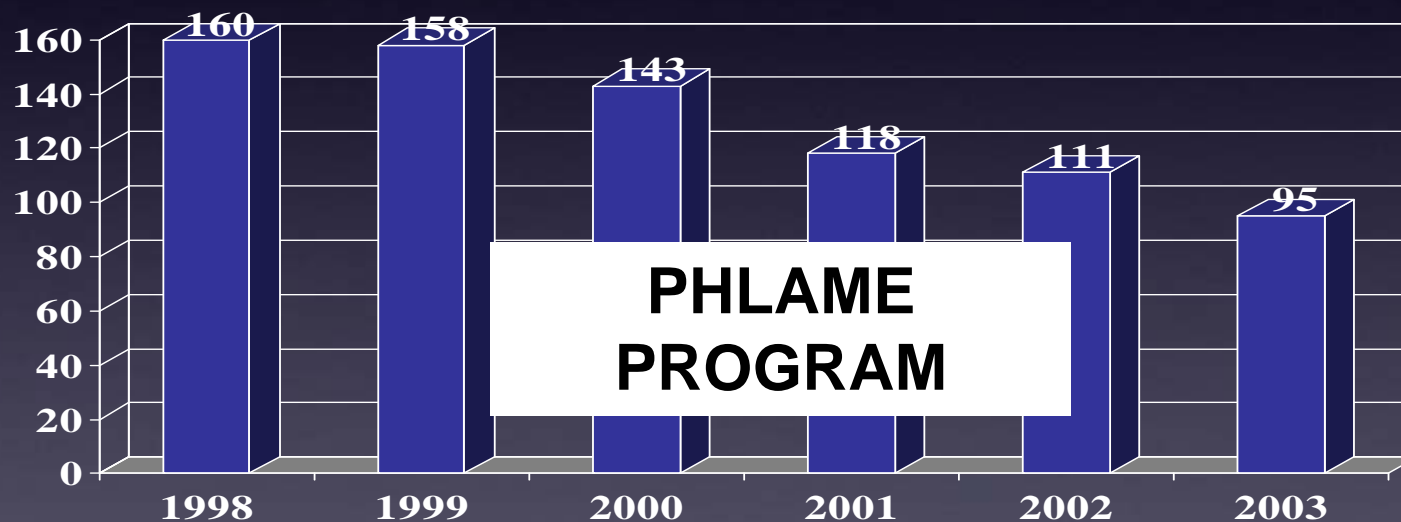
- **Changes persisted and continued to improve.**
- **High participation rate, initial positive changes (learning, habits and administrative support) in this unique environment may have achieved a tipping point to change the culture.**

Am J Health Behav 2010;34(6):695-706.

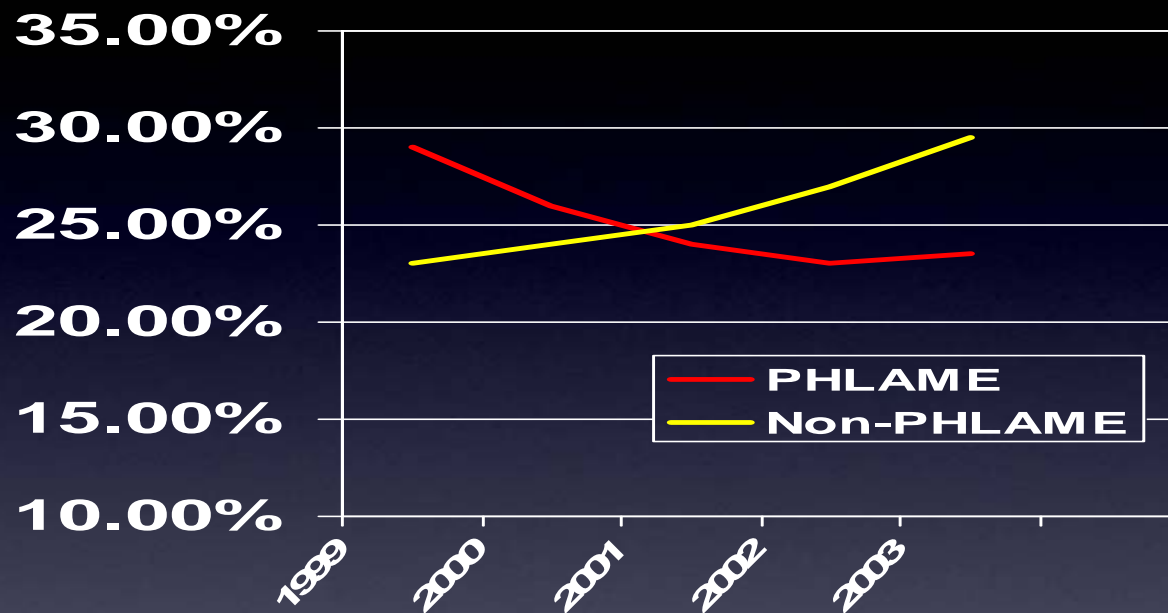
Am J Health Behav 2013;37(5):693-702.

PHLAME ROI

- Sick days were reduced 35% among the intervention participants
- Unlike national trends, workers comp claims went down for PHLAME departments



COMPARED TO MATCHED DEPARTMENTS WC CLAIMS AND COSTS WENT DOWN



Slope of annual injuries
differed significantly
($p < 0.001$)

Average amount saved per firefighter/year was \$1000, with and ROI (even including the expensive testing done) of approximately 4:1.

Occupational Medicine 2013 Apr;63(3):203-9.

IF WE BUILD IT WILL IT WORK? YES

**ALL BREAKTHROUGH & NO FOLLOW
THROUGH (LOST IN TRANSLATION)**

**HOW CAN WE GET IT OUT THERE AND
HAVE IT WORK?**

2009 American Reinvestment and Recovery Act Challenge Topic 'Pathways for Translational Research,' to define and prioritize determinants that enable and hinder translation of evidenced-based health interventions in well-defined settings.



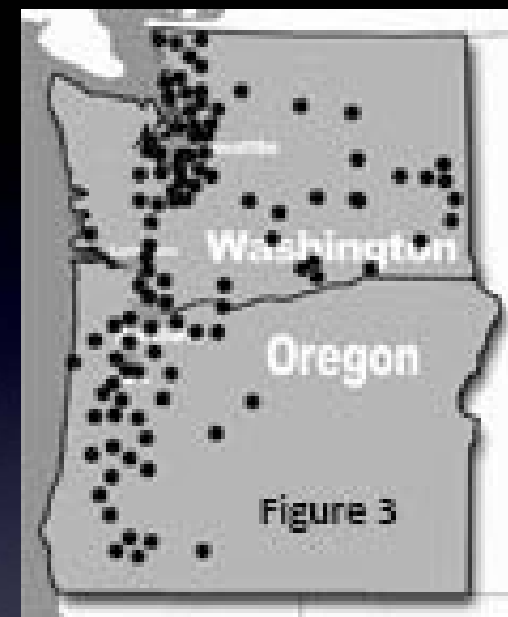
IGNITE (Investigation to Guide New Insights for Translational Effectiveness) Trial



Send materials (personalized letter, recruitment DVD, and glossy folder) to 3 key people at all the moderately sized fire departments in Oregon and Washington. (Program materials are free.)

ADOPTION: Select 12 responder or participant departments and match them with 24 non-responders.

USE: Among the 12, examine factors that lead to the program being used and having positive outcomes.





PHLAME
PROMOTING HEALTHY LIVING

WELLNESS PROGRAM FOR FIREFIGHTERS.
SAVES LIVES. CUTS COSTS.

OREGON
HEALTH
& SCIENCE
UNIVERSITY

OUR PROGRAM



EASY TO IMPLEMENT at fire stations using the existing team structure of shifts. Focuses on **NUTRITION, EXERCISE, INJURY REDUCTION, and MAXIMIZING PERFORMANCE.**



FIREFIGHTERS...

1

...learn and practice
**HEALTHY NUTRITION
AND EATING HABITS**



2

...learn about types of training
and work together to
IMPROVE THEIR FITNESS



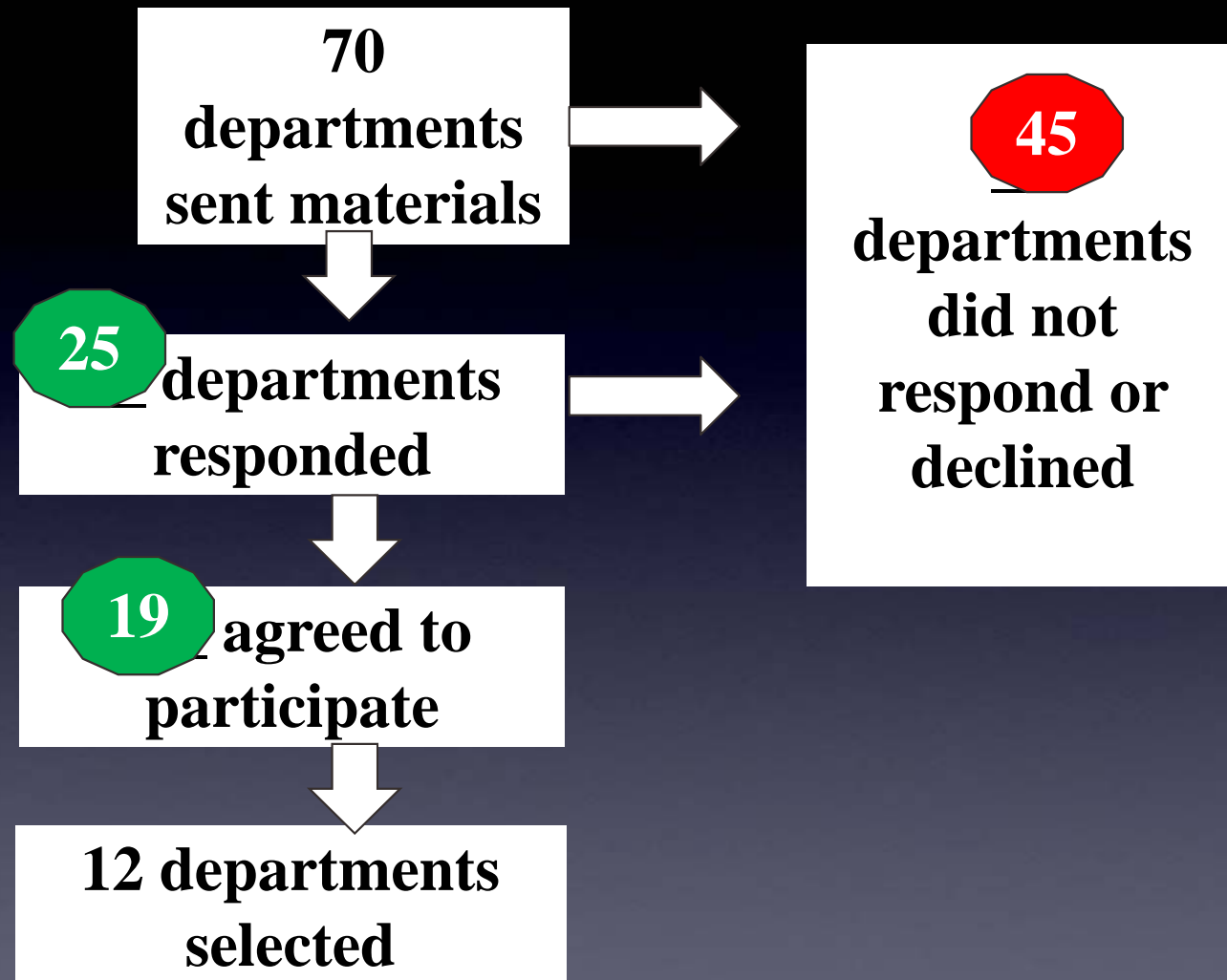
3

...work together to
**ENHANCE THEIR
HEALTH**

WWW.PHLAMEPROGRAM.COM







STEP 1: DECISION TO ADOPT THE PROGRAM

Interview key decision-makers at the 12 participating stations and 24 (matched) of the 45 non-adopters.

9/24 – never saw the mailer

3/24 – had a program

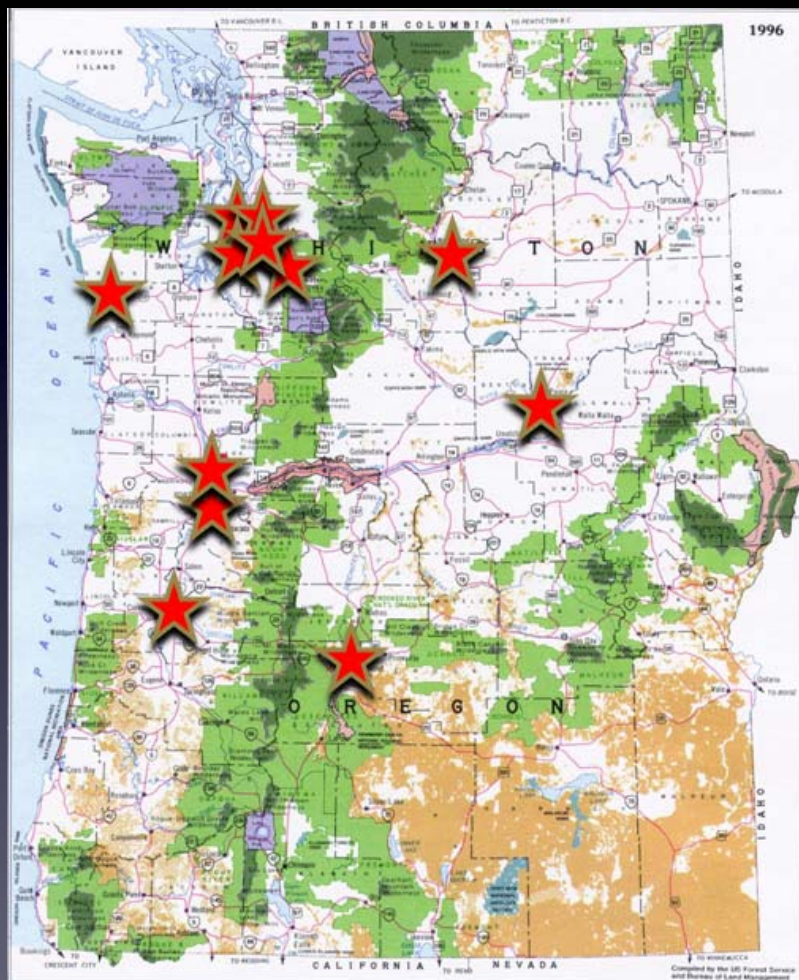
3/24 – Chief turnover

9/24 – no champ surfaced to make the call

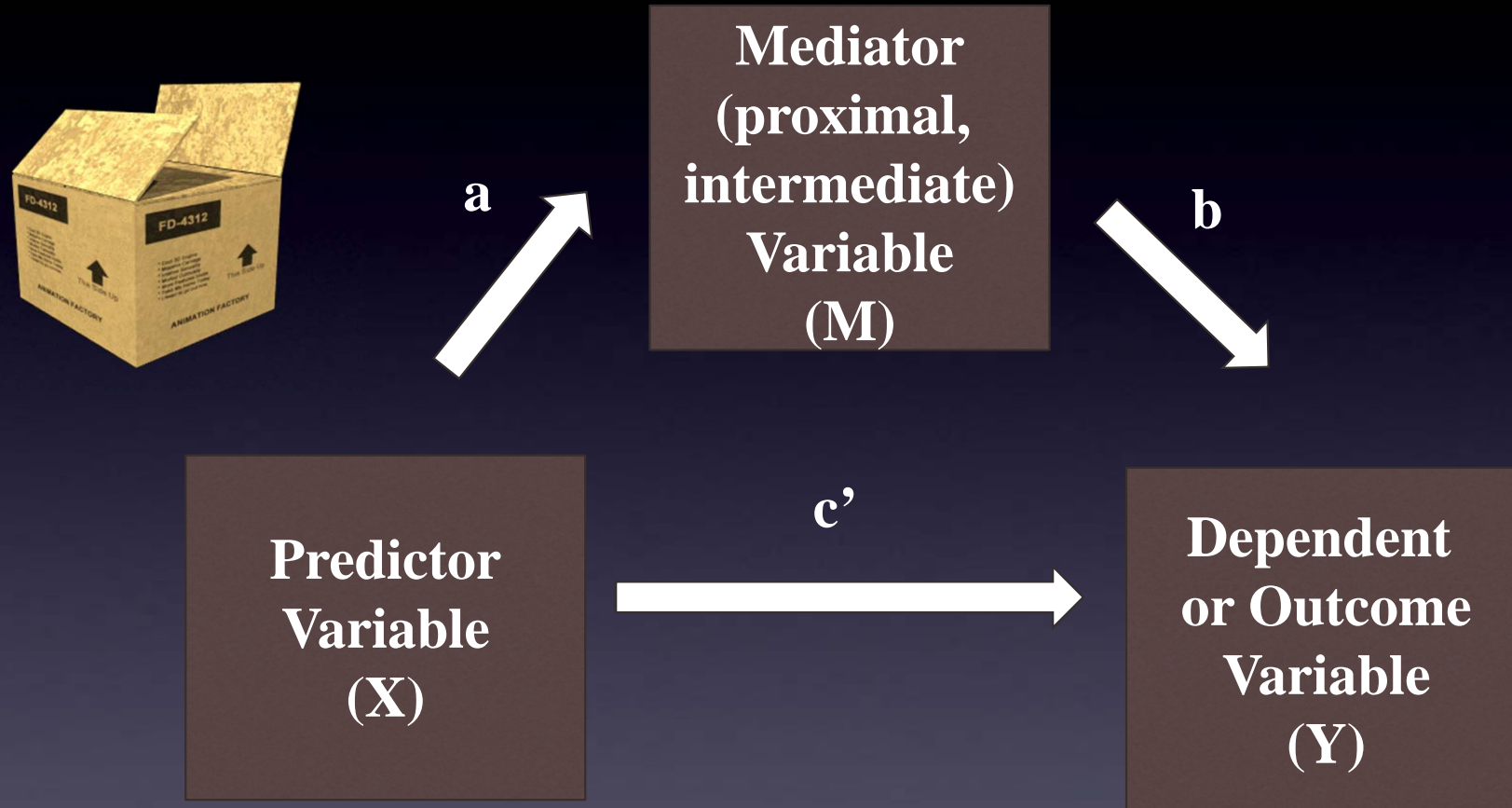
J Occup Environ Med. 2013;55(4):424-9.

STEP 2: GETTING IT USED (TRANSLATIONAL EFFECTIVENESS)

- ✦ Visit each department to collect baseline surveys from firefighters and launch the program.**
- ✦ 6-months later repeat the initial survey and self reported program outcomes.**
- ✦ Relate department characteristics (organizational climate, leadership, tailoring and competing demands) with how effectively the program was used.**

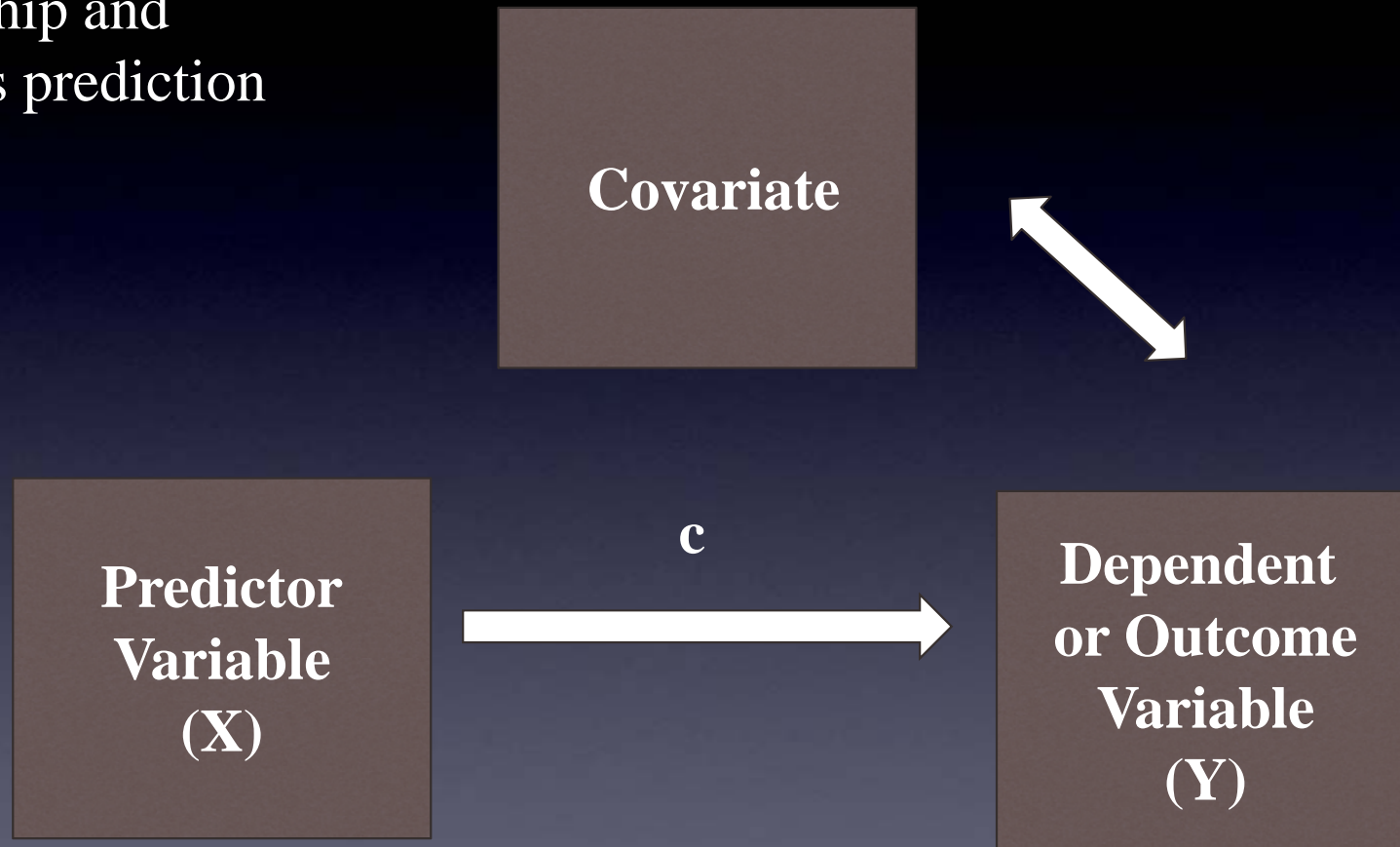


MEDIATION ANALYSIS TO OPEN THE BLACK BOX



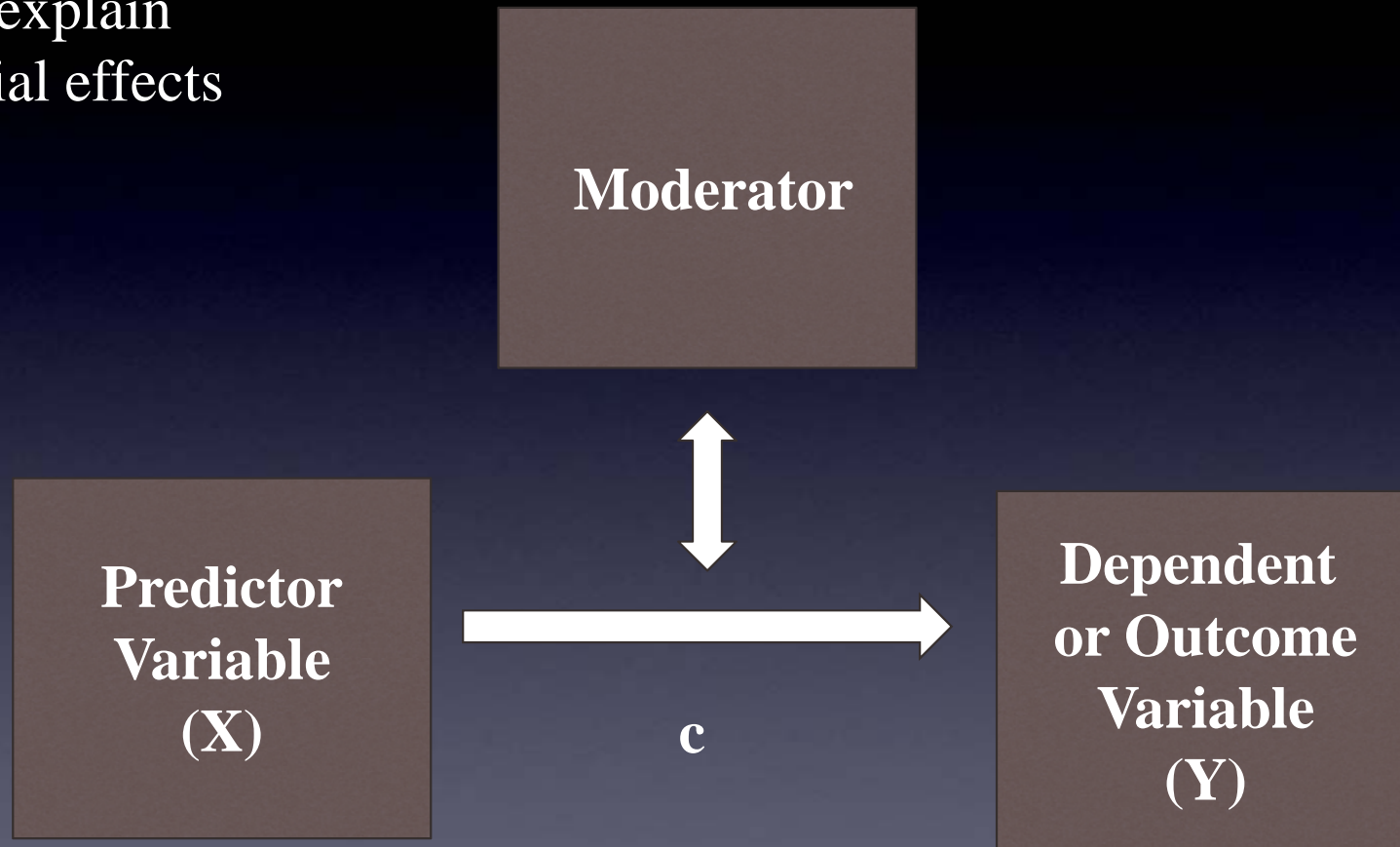
J Am Dietetic Assoc 2010;110:753-62

Covariate: Does not alter relationship and improves prediction



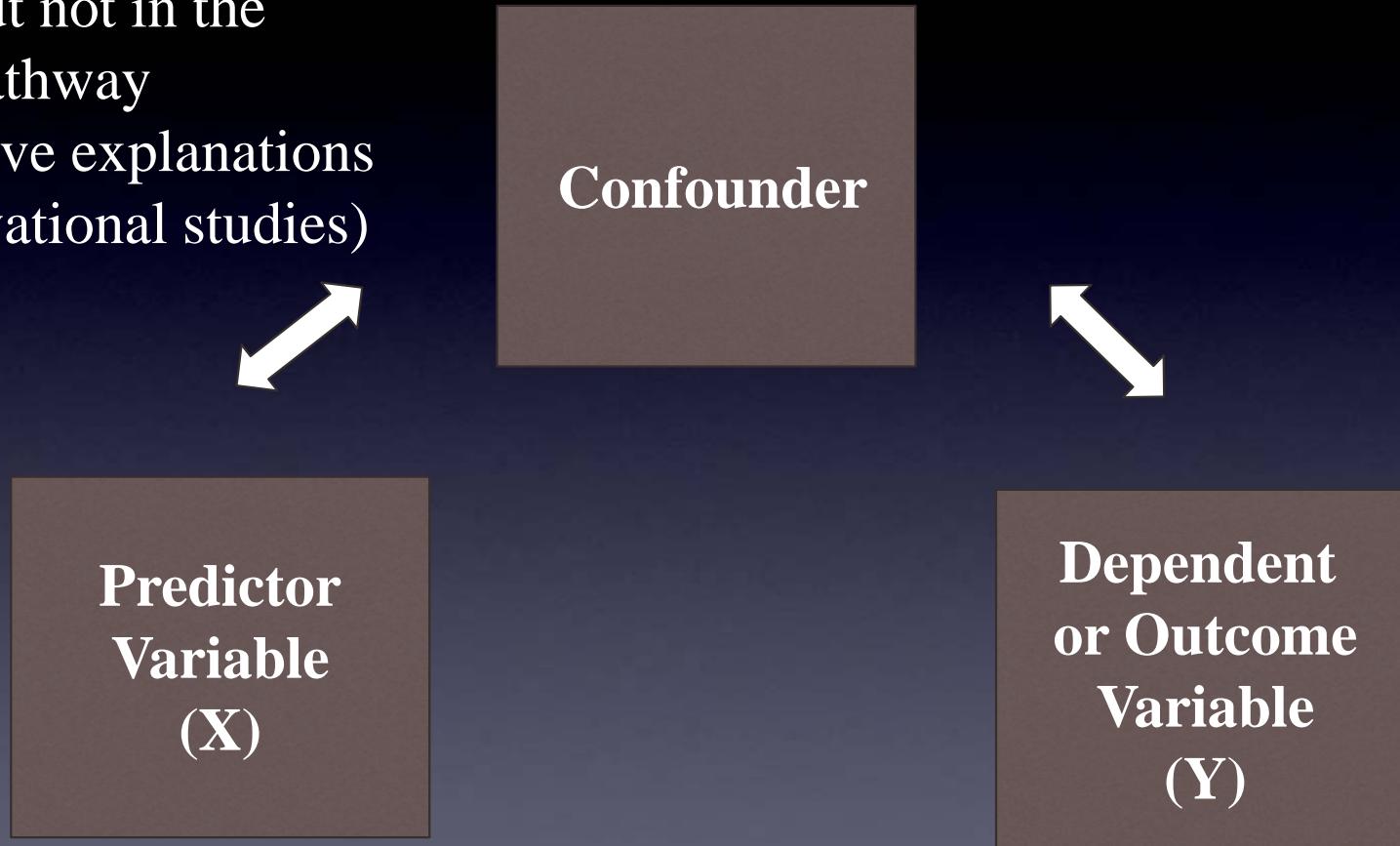
J Am Dietetic Assoc 2010;110:753-62.

Moderator (interaction effects): explain differential effects



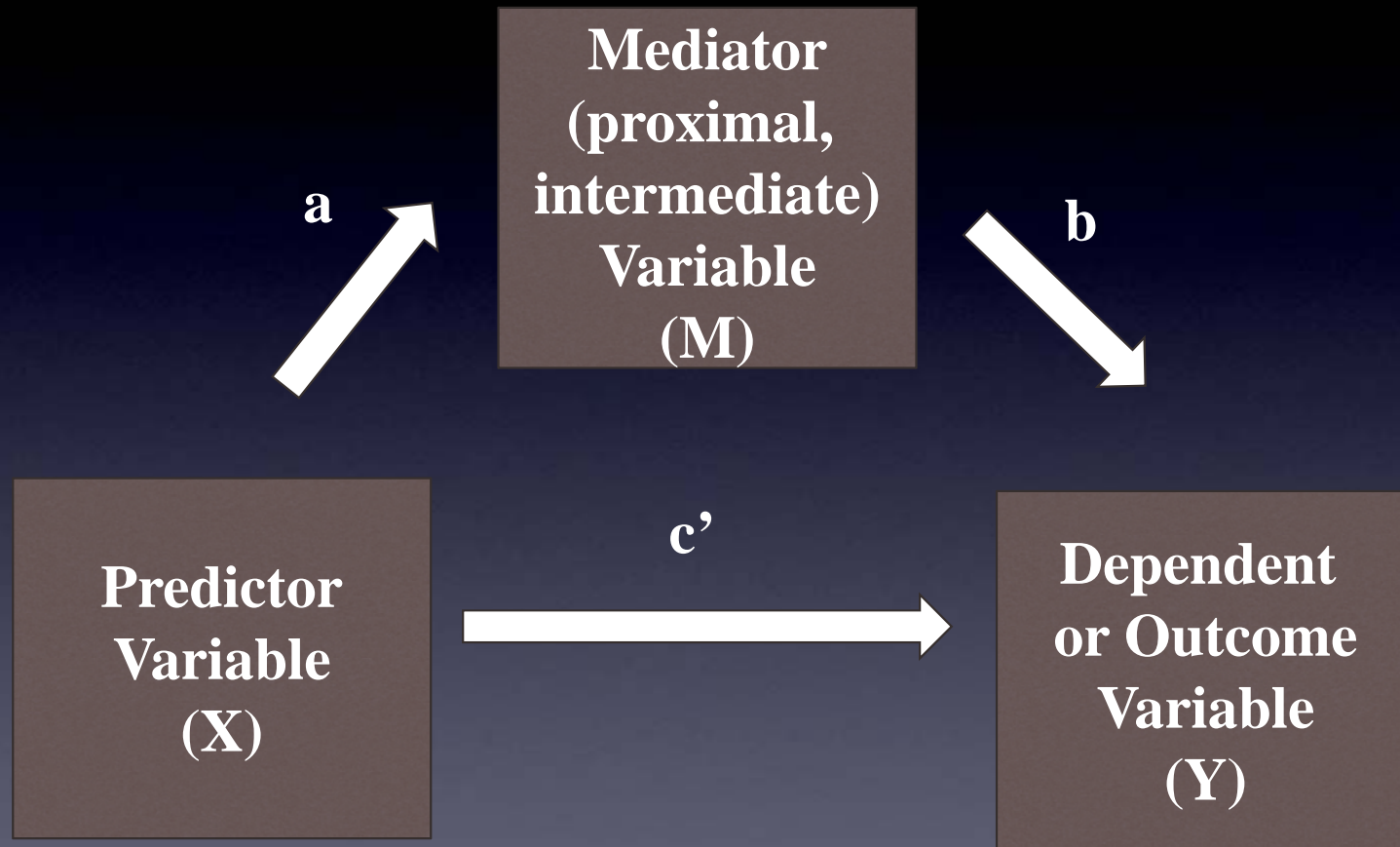
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Confounder: relates to X
and Y, but not in the
causal pathway
(alternative explanations
in observational studies)



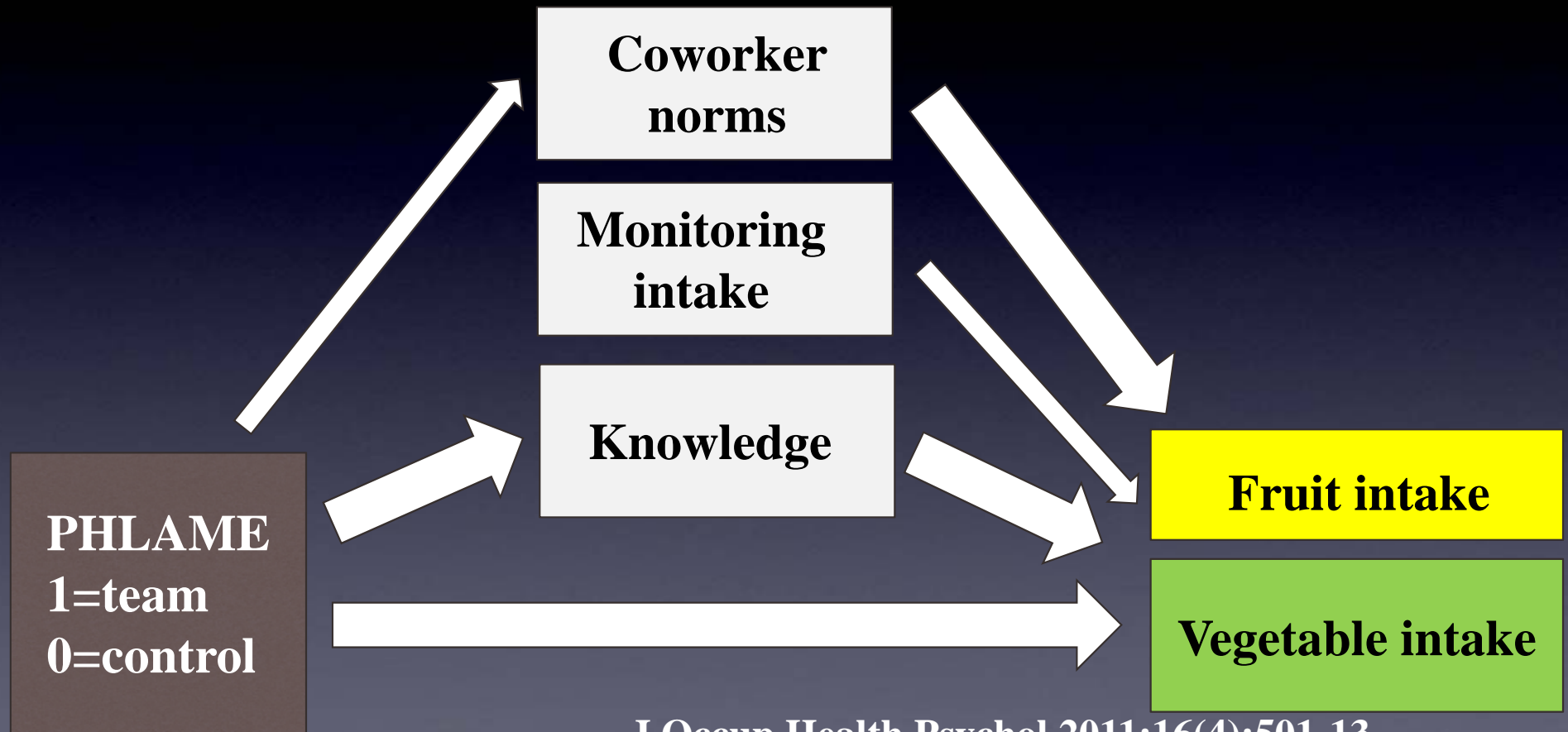
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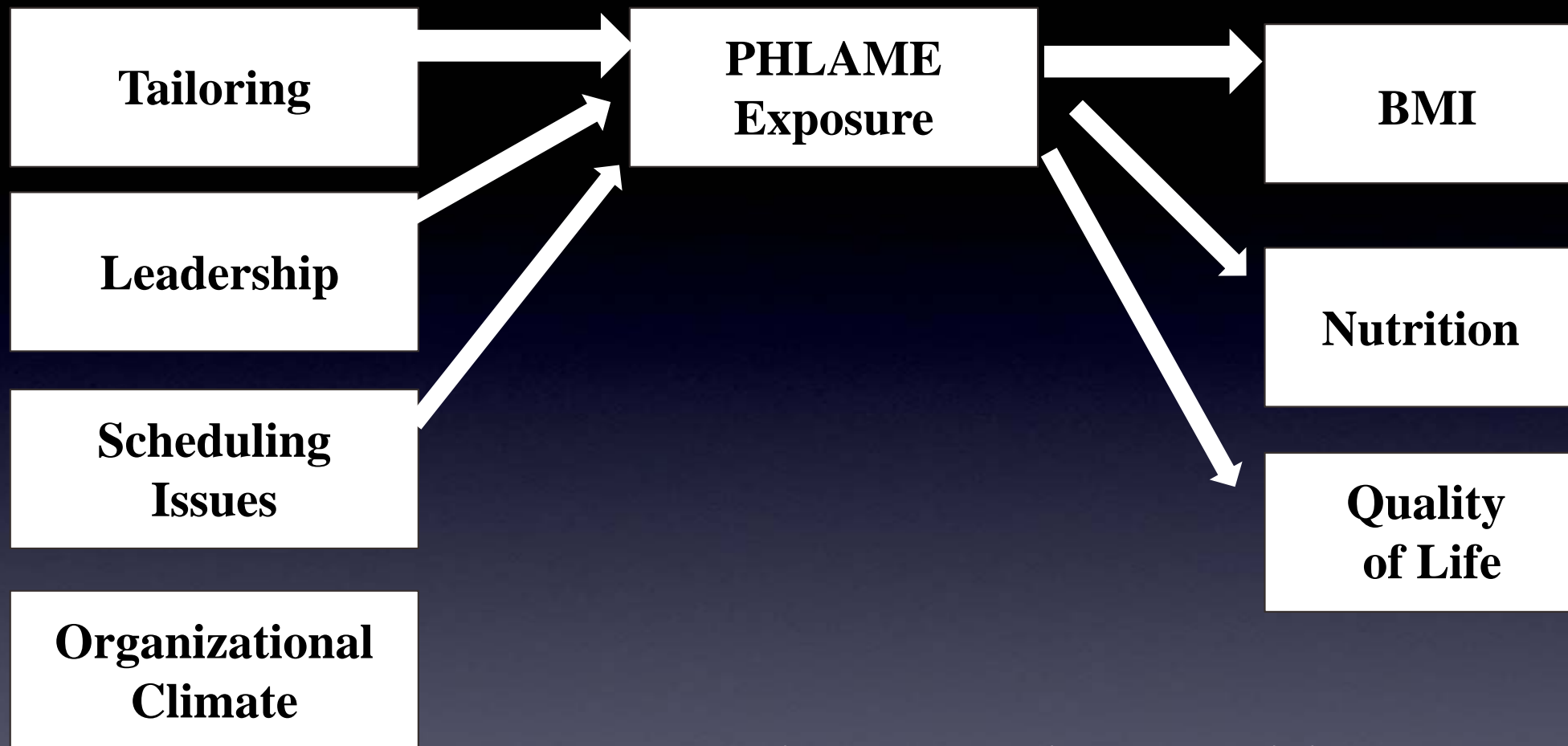


J Am Dietetic Assoc 2010;110:753-62.

PHLAME TEAM PROGRAM MEDIATION



J Occup Health Psychol 2011;16(4):501-13.



Translational Behavioral Medicine
2012;2:228-35.

AGE EFFECTS

- ✱ Age relatively restricted (mean 40 ± 9 years)
- ✱ Age did not contribute to the mediation model; looking at \leq and > 40 yo, not a moderator (no differential effects)
- ✱ Qualitative findings + & - impacts: increasing awareness was rarely sufficient for change and if anything, more difficult to change; justified changing recommendations as reason to discount them

TAKE HOME LESSONS

Team-centered peer-led programs can change behaviors.

Changing health and safety behaviors can save costs.

Programs can change the culture and durably alter behaviors.

Mediation analysis allows deconstructing what worked.

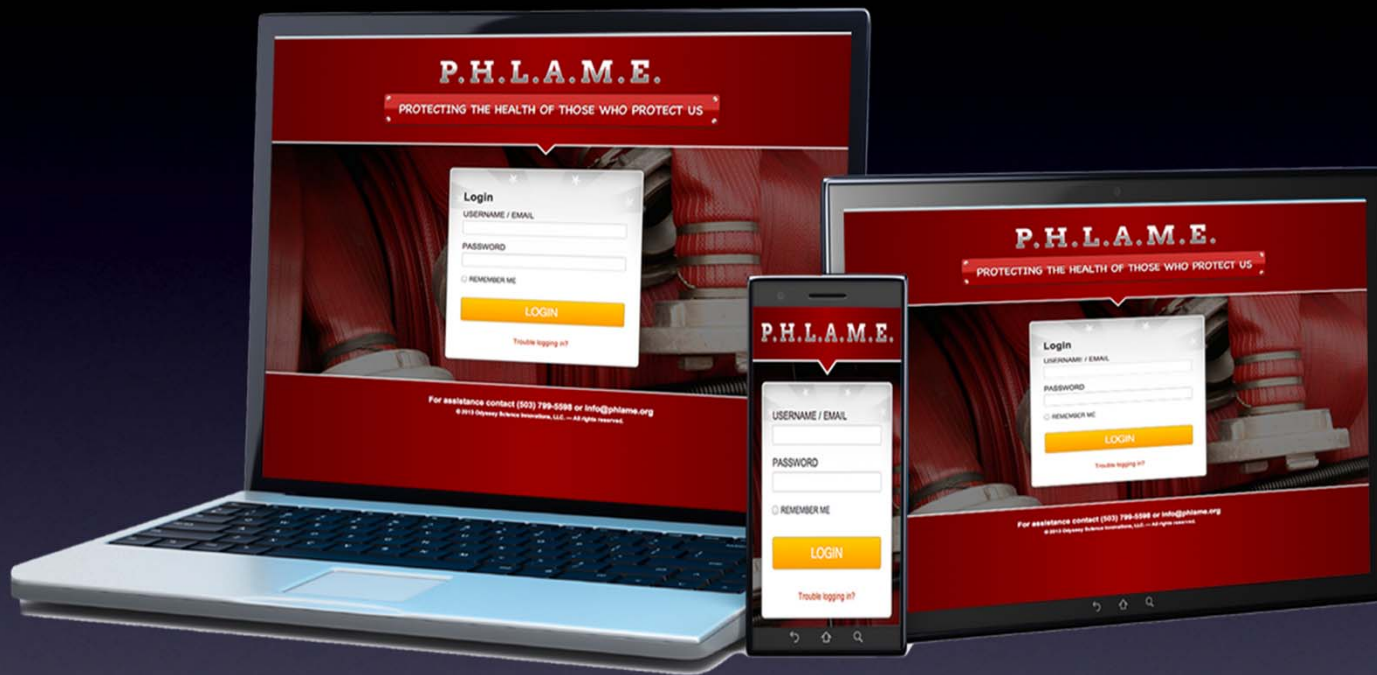
TAKE HOME LESSONS (CONTINUED)

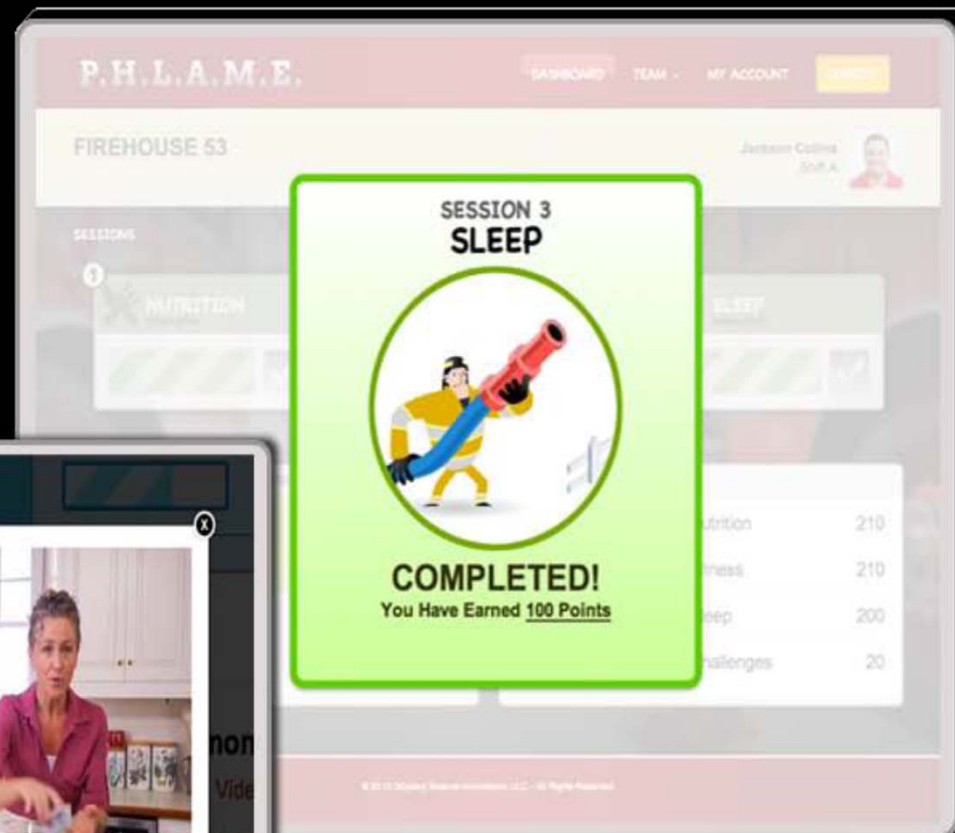
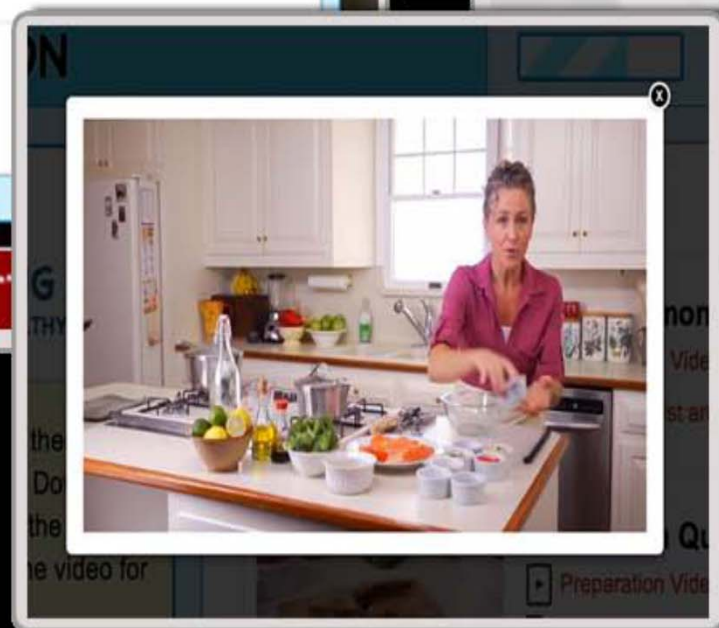
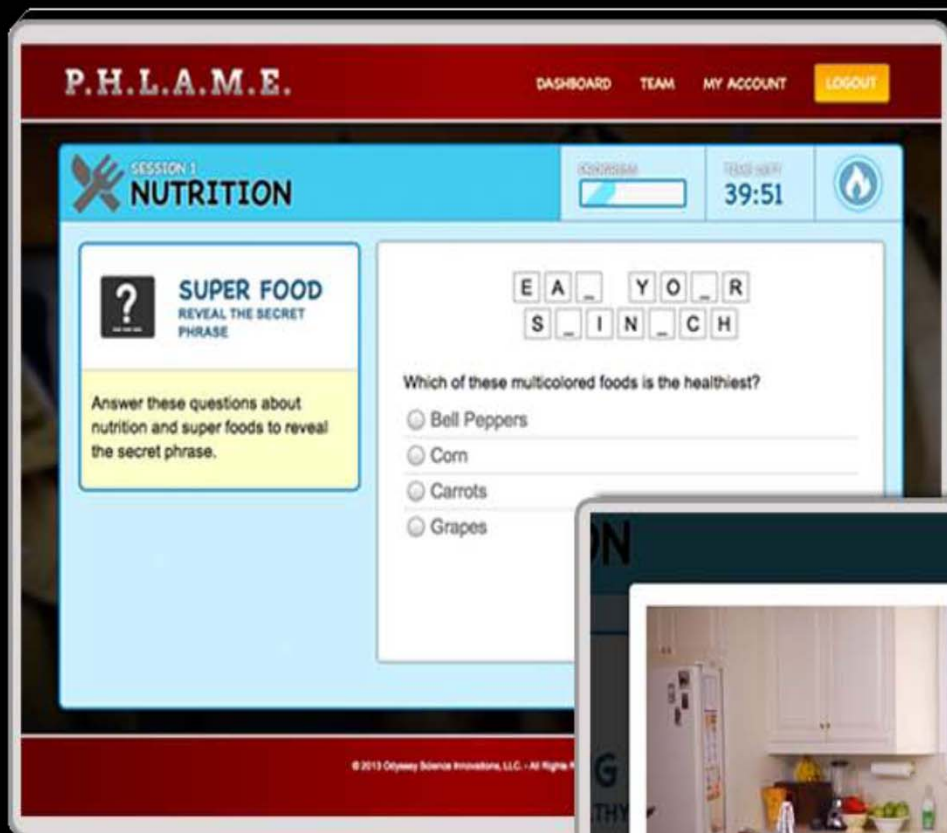
Design for dissemination (MI works, but way too costly).

Local champions can move a program forward and tailoring and leadership support can make it work.

Plan dissemination strategies and involve those partners early on.

Align TWH™ programs with worksite culture (moving PHLAME to a web-based smartphone accessible format).





STATION 29

Powellhurst Fire Station

Joe Williams
Team A



SESSION 1

NUTRITION

GO

FRUITS AND VEGETABLES GOAL

DAILY LOG

SESSION 2

FITNESS

GO

EXERCISE GOAL

?

SESSION 3

SLEEP

GO

SLEEP GOAL

?

EXTRA CREDIT

CHALLENGES		
Quit Tobacco	+15 POINTS	
Quit Alcohol	15 POINTS	<div>GO</div>
Calculate BMI	15 POINTS	<div>GO</div>
Cook Together	15 POINTS	<div>GO</div>

LEADER BOARD

YOU	TEAM	STATION	
1		John Donson	115
2		Brooke Lewis	110
3		Dan Taylor	98
4		Mike Jones	96

