



Healthy Hearts for Heroes: A Worksite Nutrition Intervention

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ABSTRACT

BACKGROUND: The single largest occupational hazard for fire fighters (FFs) is heart disease, which accounts for 45% of on-duty deaths. Hypertension, dyslipidemia, pre-diabetes/diabetes, obesity and poor diet are all highly prevalent among FFs and are all food-related. We hypothesized that a simple targeted food intervention could: 1. be successfully implemented in a real world environment, and 2. could significantly impact the overall cardiovascular health of one fire department.

METHODS: A group of FFs (active duty and volunteer) at one fire department were offered a twice-per-day food substitution program consisting of ready-to-eat products high in whole grain fiber, omega-3 fatty acids, antioxidants and plant sterols. Participation was entirely voluntary and study entry was timed with occupational health physicals (OHPs). Participants were encouraged to voluntarily undergo repeat cholesterol testing 30-35 days after starting the food intervention, but were not instructed to change any other behaviors. Outcome measures included study participation and dietary sustainability rates as well as change in average lipid profiles.

RESULTS: In the present study, 37 of the 44 eligible FFs enrolled in the program, yielding an 84% participation rate. This contrasts favorably with participation rates in worksite weight loss, fitness and smoking cessation programs which traditionally average 10%, 21%, and 7% respectively. 19 of the 37 FFs completed follow-up lab testing indicating, at minimum, a 50% dietary change sustainability rate, despite adverse timing of the study. Compared to expected lipid changes, on average, HDL improved 6 mg/dL (14%) (expected no change), while LDL fell 1 mg/dL (expected 9 mg/dL increase) and TGs rose 9 mg/dL (expected 53 mg/dL increase). 90% of participants achieved HDL elevation. Other observed endpoints included decreases in soda consumption, weight loss in some FFs, and reconsideration of the health screening metrics comprising the OHPs.

CONCLUSIONS: Among firefighters, a simple actionable dietary change can have a high rate of uptake and result in a meaningful reduction in cardiovascular risk. Given its simplicity and minimal support requirements, this type of nutrition intervention program could be replicated in other high risk cohorts.

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Conflicts of Interest: The author is co-founder of SOF. SIM has no conflicts to disclose.

INTRODUCTION

In Firefighters (FFs) cardiovascular (CV) disease accounts for 45% of on-duty deaths, a rate that is twice that of police officers and three times that of the general population. For every FF CV death, there are 17 additional non-fatal CV events. CV disease risk factors are highly prevalent among FFs:

Risk Factor	Firefighter prevalence	US Adult prevalence
Hypertension	20-30%	29%
Pre-hypertension	50%	33%
Diabetes	1-4%	9%
Pre-diabetes	30%	34%
Low HDL	30%	23%
High TG	20%	30%
Obesity	41%	35%

These risk factors are diet driven. Firehouse culture favors foods high in sodium, saturated fats and processed carbs. We hypothesized that a targeted whole-food plant-based dietary intervention could:

- Be successfully implemented even in a work environment with unpredictable schedules
- Measurably impact FF lipid profiles in 30 days.

METHODS AND MATERIALS

- All active duty and volunteer FFs at one fire department were offered a food substitution program consisting of 6 commercially available, ready-to-eat, whole-food plant-based products, each serving supplying, on average:
 - 6 grams fiber
 - 2.5 grams omega-3 fatty acids (ALA)
 - 1 gram phytosterols (80:20 sterol/stanol)
 - 3,000 umol antioxidants (ORAC)



- FFs were instructed to consume the foods in any combination 2x/day whether on- or off-duty.
- Participation was entirely voluntary and study entry was timed with the FF group's annual occupational health physicals (OHPs), to which fasting lipid profile assessment was added.
- Participants were encouraged to voluntarily undergo repeat cholesterol testing 30-35 days after starting the food intervention, but were not instructed to change any other behaviors.
- Over the course of the intervention all FFs received 2 one-hour sessions of didactic nutrition education as part of their scheduled mandatory training sessions.
- Outcome measures included study participation and dietary sustainability rates as well as change in average lipid profiles.

RESULTS

STUDY PARTICIPATION:

OHPs occurred in the first part of November, 2014 such that the food intervention occurred over the Thanksgiving and Christmas holidays. 37 of the 44 eligible FFs enrolled in the program, yielding a **84% participation rate**.

DIETARY CHANGE SUSTAINABILITY:

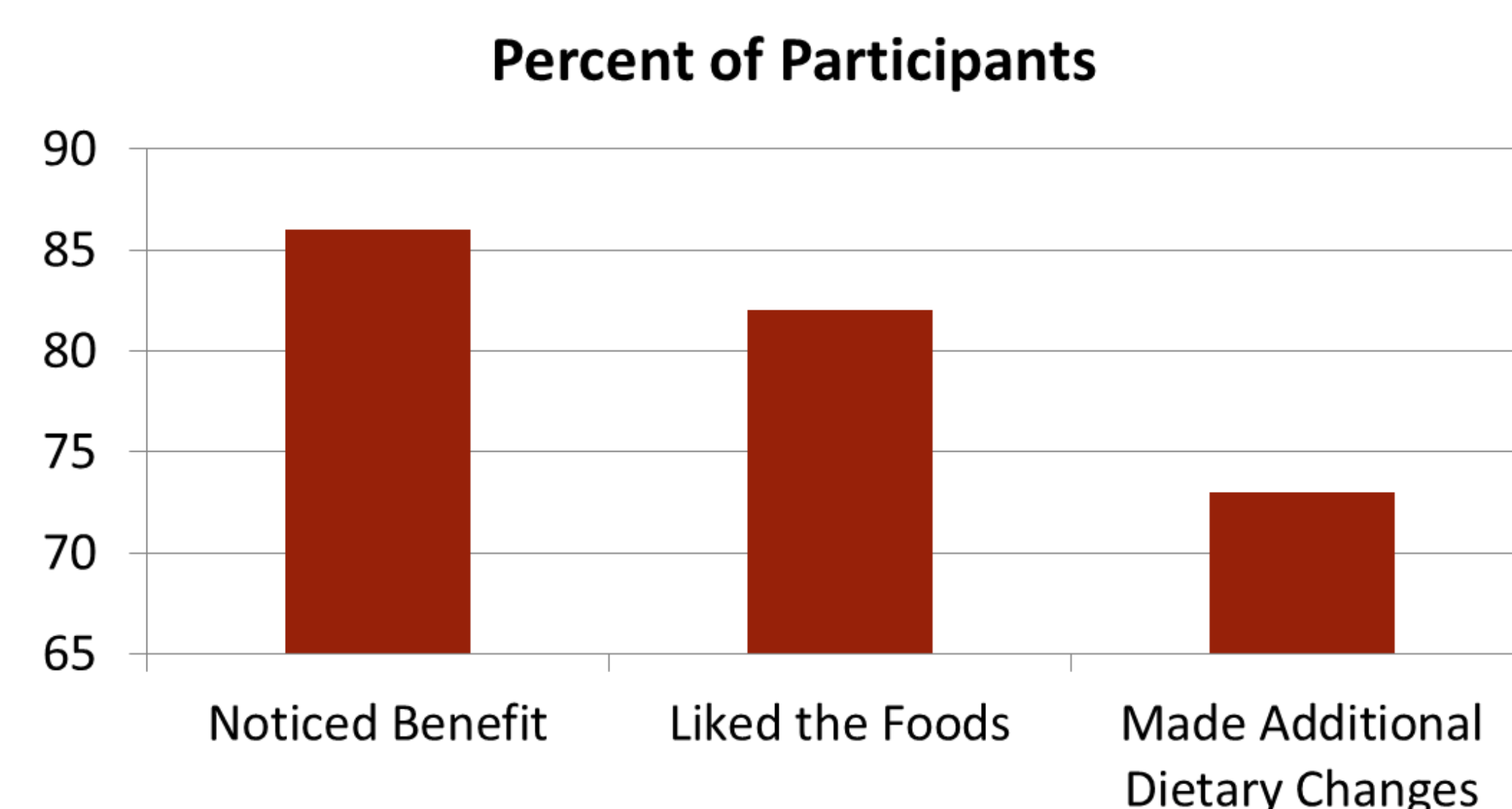
Despite adverse timing of the intervention, 19 of the 37 FFs completed follow-up lab testing indicating, at minimum, a **50% dietary change sustainability rate**.

AVERAGE LIPID PROFILES*:

Lipid Parameter	Pre (mg/dL)	Post (mg/dL)	Change (mg/dL)
HDL	42	48	+ 6
LDL	109	108	- 1
Triglycerides	121	130	+ 9

*These results are based on 16 complete pre/post lipid assessments. 2 FFs did not provide starting lipid levels and 1 FF made marked changes in supplement use between lab evaluations.

PRODUCT FEEDBACK SURVEY:



ADDITIONAL PARTICIPANT FEEDBACK COMMENTS:

- "I feel better."
- "I've started to pay attention to ingredients."
- "I lost 8 pounds."
- "I stopped drinking Mountain Dew."

ADDITIONAL OUTCOMES:

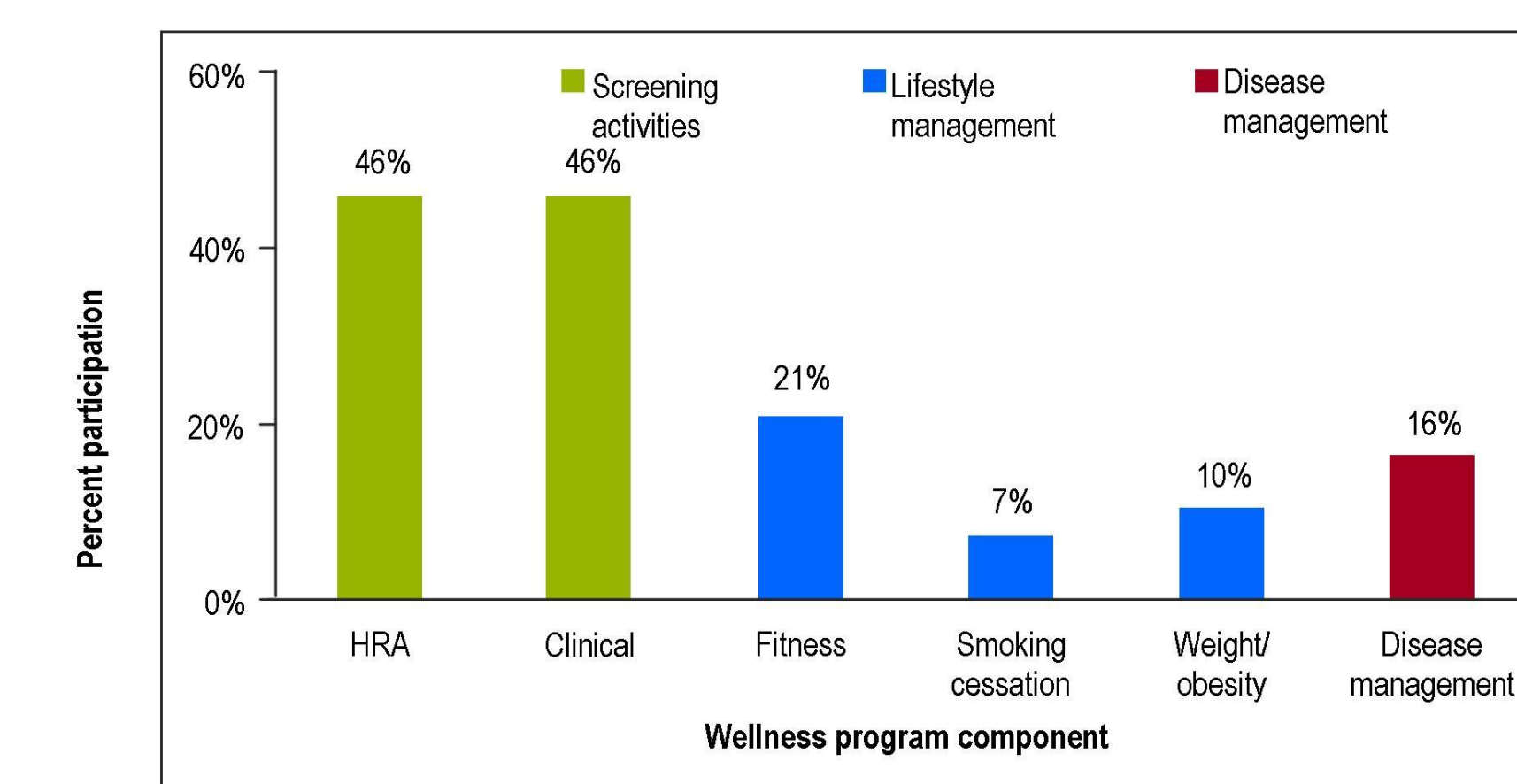
- This fire department perceived such significant benefit from the food intervention experience they have submitted a FEMA Grant application to expand this program to 1000 FFs in Minnesota, the ultimate goal being a paired nutrition education/dietary intervention campaign that can be replicated in all Fire Departments across the US and Canada.
- The FFs are also working with their OHP provider to re-evaluate the components of their annual screening assessment to include routine lipid testing.

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DISCUSSION

Typical worksite wellness initiatives (WWIs) have poor participation rates, likely due to a mismatch between program design and worker realities:



FFs have unpredictable schedules and generally low food preparation skills, making any education-based or cooking-based nutrition WWI impractical. Our simple, actionable intervention was specifically designed to overcome the barriers of lack of time and lack of skill.

Other than tracking participation, most WWIs cannot provide timely feedback regarding outcomes, as their intended effects (e.g. weight loss) require months or years to materialize. Our intervention has immediate impact and can yield measurable, objective results in as little as 30 days.

The intervention occurred over the holiday season with expected lipid profile deteriorations (9 point LDL increase, 53 point TG increase, no change HDL). Despite adverse timing, we were still able to achieve favorable lipid changes.

Given that a 1 point increase in HDL translates into a 2-4% reduction in CV risk, we made a significant impact in a short period. And the HDL effect was not concentrated in a few participants, rather **90% of FFs experienced a positive HDL change**. These types of results have been previously heralded as markedly significant in statin/niacin trials.

The population studied had relatively low average LDL values. In other self-selected statin intolerant/statin unwilling patients with baseline LDL>130 mg/dL, we have demonstrated, on average, a 39 point LDL reduction in 30 days with 2x/day use of these products.

LIMITATIONS: FFs were instructed to avoid making additional lifestyle changes, but confounders cannot be excluded. However, if the food intervention was the catalyst for additional positive lifestyle change, this would also be a positive outcome. Group effect could have also played a role in increasing adherence/success. However this is intrinsic to any WWI program

CONCLUSIONS

Among firefighters, a simple actionable dietary change can have a high rate of uptake and result in a meaningful reduction in cardiovascular risk.

Given simplicity and minimal support requirements, this type of nutrition intervention program could be replicated in other high risk cohorts.