

PHLAME Long-term Effects – Results of Seven Years of Follow-up

(Preliminary report of findings that were presented at the 2009 Society for Prevention Research national meeting)

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Firefighters are at higher risk for certain medical problems. The incidence of malignancies among firefighters is increased. In addition, their cardiovascular risks are comparable to other worker groups, and that combined with episodic extremely physically demanding work, may account for myocardial infarctions being the leading cause of death when fighting fires. This report presents long term outcomes of the PHLAME program, a health promotion program for firefighters. The original PHLAME health promotion study compared 1) a TEAM program, 2) individual health coaching and 3) a testing only condition. All firefighters at a station were in the same study condition (the TEAM program, motivational interviewing [MI, a type on one-on-one coaching] or testing only). Both the TEAM and MI groups achieved significantly improved changes in eating and exercise habits and body weight, and the PHLAME project was continued to evaluate maintenance of healthier behaviors. In this report, we present outcomes from the baseline, two intervention years and four additional follow-up only years. The details the short term findings of the TEAM and health coaching group (MI) previously have been reported (J Occup Environ Med 2007;49:204-213) and is available on PHLAME website (www.ohsu.edu/ohsuedu/academic/som/medicine/hpsm/upload/JOEM.pdf).

METHODS

The original study participants were 599 firefighters from 5 fire departments in northern Oregon and southern Washington. The original firefighter cohort (fall of 2000) was predominately male, white (90.5%) and married (79%), with a mean age of 40.7 years. On average, participants had 15.4 years experience as a firefighter. Initial enrollment was high at 86% of eligible firefighters, of whom 80% were retained at one year. Between the intervention and longitudinal follow-up phase, because of administrative changes, one of the original five departments elected not to participate. Thus, four departments are represented in the four year follow-up only data. In those follow-up only years, participants received only annual assessments and a written health risk appraisal. As with the control condition in the initial years, firefighters were mailed their results, similar to what might occur following a physician visit. Firefighters also had access to a common website that provided additional information about each result, optimum values and normative findings for firefighters. The last year of data collection was completed in January 2008.

Measures

Anthropometric measures were assessed at baseline and each subsequent measurement wave: height, weight, and calculated body mass index (BMI) (weight in kg/[height in meters]²). Aerobic capacity was assessed with measured maximal oxygen uptake during incremental treadmill exercise to maximal exertion during the baseline, two intervention years and final follow-up year. During other time, maximal oxygen uptake was estimated from submaximal incremental treadmill testing using the individuals' heart rate, workload and perceived exertion relationships from their prior testing. At each assessment, firefighters also completed a survey assessing demographics and self-reported physical activity, self-reported dietary behaviors and other potentially influential factors. Dietary habits were indexed using a validated screening instrument for daily servings of fruits and vegetables.

RESULTS

Firefighters were comparable to U.S. adults in their body weights. The average BMI for the entire sample at baseline was 27.7, slightly higher than the national average of 26.6. At baseline, participants' average consumption of fruits and vegetables was 5.6 servings a day, and less than one-third (28%) consumed the recommended 5 servings a day, compared to the national average of 23% for adult males.

Firefighters also did slightly better than the national average for their exercise habits. More than half (55%) performed at least 30 minutes of moderate exercise 5 times per week or did 20 minutes of intense exercise at least 3 times per week.

Figure 1 (A – F) shows the pattern of long-term changes during the seven years (or waves) of follow-up. In general, the initial advantages of being in the TEAM or MI (one-on-one health coaching) groups, instead of the control condition, became less over time. Usually, when program benefits are not maintained in longitudinal studies, the interpretation is that the positive changes from the experimental program were not sustained. However, the Figures indicate a different pattern, and the Y axes also provide an index of the magnitude of change over time.

Figure 2 A is the objective measure of aerobic endurance. Both experimental groups, and to a lesser extent the control condition, appeared to increase their fitness following the initial two intervention years, with some decrement in the final assessment. Without regular training, an aging population would be anticipated to experience a decrease in aerobic endurance of approximately 1% per year. The observed increase among PHLAME participants might represent changing demographics, with a younger mean age. However, Figure 2 F depicts the average age for the three groups across time, and it demonstrates that as expected, the PHLAME firefighters' age increased.

Figure 2 C shows daily servings of fruits and vegetables. Although no statistical difference was observed between the experimental and control condition in later years, both the TEAM and MI groups reported more servings of fruit and vegetables compared to controls at most time points. In general, TEAM participants appeared on a sustained upward trajectory, and the MI and control groups' daily intakes in the final wave were approximately one serving per day greater than baseline levels. Population studies indicate an increase of as little as 0.3 servings per day may have significant health benefits.

Finally, Figure 2 E presents the BMI for each group across the 7 study measurement waves. Population trends indicate that for an average individual BMI would be expected to have increased approximately one BMI unit (an 8 pound weight gain) over the 7 years, However the final weights were equal of less than their initial weights. The social support constructs for regular physical activity and healthy eating habits (Figure 2 B and D, respectively) also appeared to show upward trends across the 7 annual assessments.

DISCUSSION

Few studies have assessed dietary and physical activity behaviors for more than one or two years following an experimental program, and in general positive effects have not been maintained. The original PHLAME health promotion program achieved positive changes, and the benefits of being in the experimental TEAM program or one-on-one health coaching also dissipated over time. However, rather than loss of benefits, that seemed to be due to the control group improving. Contrary to what would be predicted in these aging firefighters, during the four follow-up testing only years across groups weights did not vary, eating habits improved and fitness levels increased.

Several factors may have contributed to all participants improving over time. The first relates to the unique characteristics of fire departments and a high initial study participation rate. Over time members from intervention and control stations may have communicated due to transfers and cross talk at department-wide trainings. Thus, there were opportunities for admixing of study groups, and over time all participants may have benefitted from the changes made by the original experimental groups. And unlike many occupational wellness programs, our study participation was high at the outset, which also may have allowed maintaining healthier behavioral norms and sustained positive environmental influences at stations. In addition, firefighters have traditions of adopting uniform work habits, which over follow-up years, may have further facilitated diffusion of program effects to control participants. The second may relate to receiving annual testing. In general, health assessments alone do not change behavior. Although not sufficient to initiate change behavior, repeated assessment combined with an environment of healthier coworkers' behaviors also may have assisted maintaining positive health habits.

A tipping point describes a situation where an incremental change past a threshold produces a much larger effect. The PHLAME longitudinal findings indicate that involving two-thirds of employees from these unique worksites in effective health promotion programs may have surpassed a tipping point in achieving and maintaining positive health behaviors for all workers.

Figure 1. TEAM and MI (motivational interviewing which is a type of health coaching) were the original PHLAME experimental groups, and firefighters from stations assigned to the control condition only received annual assessments. Beginning in wave (or year) 4, each year the participants were reassessed. However the original PHLAME health promotion program only occurred between the baseline (wave 1) and wave 3. Measurements for waves 4 to 5 are follow-up only years.

