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ORIGINAL PAPER

With Small Power, Comes Great Responsibility: Lessons Learned from an Evaluation of Veteran and Military Mental Health Public Awareness Campaigns

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Abstract
This study was conducted to determine the feasibility of conducting a cost–benefit evaluation of federally-funded media campaigns encouraging mental health help-seeking among United States military personnel and veterans. To calculate the necessary sample size for the evaluation, we obtained campaign costs, and determined the number of treatment seekers needed for the campaign to break even with its cost and the associated population change that an evaluation would need to detect. The sample size needed for an evaluation with 80% power was greater than the total population of U.S. military personnel and veterans. Given that the necessary sample size exceeds the population to be sampled, an appropriately powered outcome evaluation is not feasible. Other programs that would be cost effective with extremely small effect sizes should not be subject to underpowered and thus inaccurate empirical outcome evaluation.

Keywords Mental health · Evaluation · Media campaign · Military health · Veteran health

Introduction

In 2015, former U.S. President Barack Obama designated improving mental health outcomes for service members, veterans, and their families as a Cross-Agency Priority Goal (CAP-G) (Cross-agency priority goal: Service members and veterans mental health, undated) aimed at accelerating progress in areas that require cross-agency collaboration. An interagency task force co-chaired by representatives from the Executive Office of the President, U.S. Department of Defense (DoD), U.S. Department of Veterans Affairs (VA), and U.S. Department of Health and Human Services (HHS) was formed to assess progress toward the goal. As part of this effort, we were asked to undertake an outcome evaluation of four mental health public awareness campaigns: (1) Real Warriors Campaign operated by DoD; (2) Make the Connection and the public awareness campaign materials used to promote the Veterans Crisis Line, operated by VA; and National Recovery Month, operated by HHS. While each of these campaigns had used some form of evaluation (e.g., formative while developing the messages and materials, tracking dissemination) in the past, none of them had been subjected to a rigorous outcome evaluation.

One part of the evaluation focused on whether the benefits of the campaigns outweigh their cost. However, an outcome evaluation of these national campaigns would likely be expensive, and we had to decide whether to spend resources on an evaluation. This article describes how we identified the minimum number of additional treatment seekers needed each year for a campaign to break even on cost and why this led to the conclusion that an outcome evaluation was inadvisable.

Methods

Limited research exists on the expected effect size for similar campaigns (Evans-Lacko et al. 2013, 2014; Henderson and Thornicroft 2013). The goal of our analysis was to calculate the number of people we would need to survey to detect a

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positive financial return on investment. The primary hypothesized effect of the campaigns is increased mental health treatment utilization. For the purposes of the cost analyses, we looked at the lost income due to mental health problems as the financial benefit of the campaign. Prior studies have shown that mental health disorders among military and veteran populations lead to lost wages from missed days of work and decreased productivity (Kilmer et al. 2011). In contrast, effective treatment can improve wages in the general population (Lave et al. 1988; Schoenbaum et al. 2001), which we assume also applies to service members and veterans.

One way to measure the net financial benefit of treatment is to compare the annual cost of caring for additional treatment seekers to the increase in annual wages for those whose treatment is successful. If the total net benefits of treatment exceed the costs of both treatment and the campaign, then a campaign has a positive return on investment. A meaningful evaluation would therefore need the ability to detect a change in the number of treatment seekers required to yield a positive net return.

To calculate the net benefit per additional treatment seeker, we combined estimates of treatment costs, treatment effectiveness, and wages from several sources (Fig. 1). Depending on their mental health disorder, U.S. military personnel lose between 7.8 and 45.2% of their annual wages on average, and veterans lose between 15.8 and 45.2% (Kilmer et al. 2011). This works out to losses of $3800 to $21,900 per year, based on the 2015 mean annual U.S. civilian wage across all occupations (Bureau of Labor Statistics 2016).

In terms of outlays, the campaigns spent a maximum of $3.7 million per year. The average annual cost of treatment was $2008 per person in 2015 dollars (Agency for Healthcare Research and Quality 2013). On average, 33.97% of patients receive effective treatment and recover (Kilmer et al. 2011). We assumed that these patients would earn the full value of lost wages as a result of treatment—an estimated $12,590 on average.

Next, we calculated the number of treatment seekers needed to generate $3.7 million in net benefits that would allow the campaign to just break even. We assumed that 22.1% of U.S. military personnel and veterans are exhibiting symptoms consistent with a mental health disorder (Psychological Health Center of Excellence 2017). Typically, 7.5% of these individuals initiate treatment each year (Kilmer et al. 2011). Assuming veterans initiate treatment at the same rates, these treatment seekers represent 1.66% of U.S. military personnel and veterans.

Finally, we calculated the number of U.S. military personnel needed in a sample to detect an increase in the number seeking treatment from 1.66% to a percent that will yield an annual financial benefit equal to the campaigns' break-even

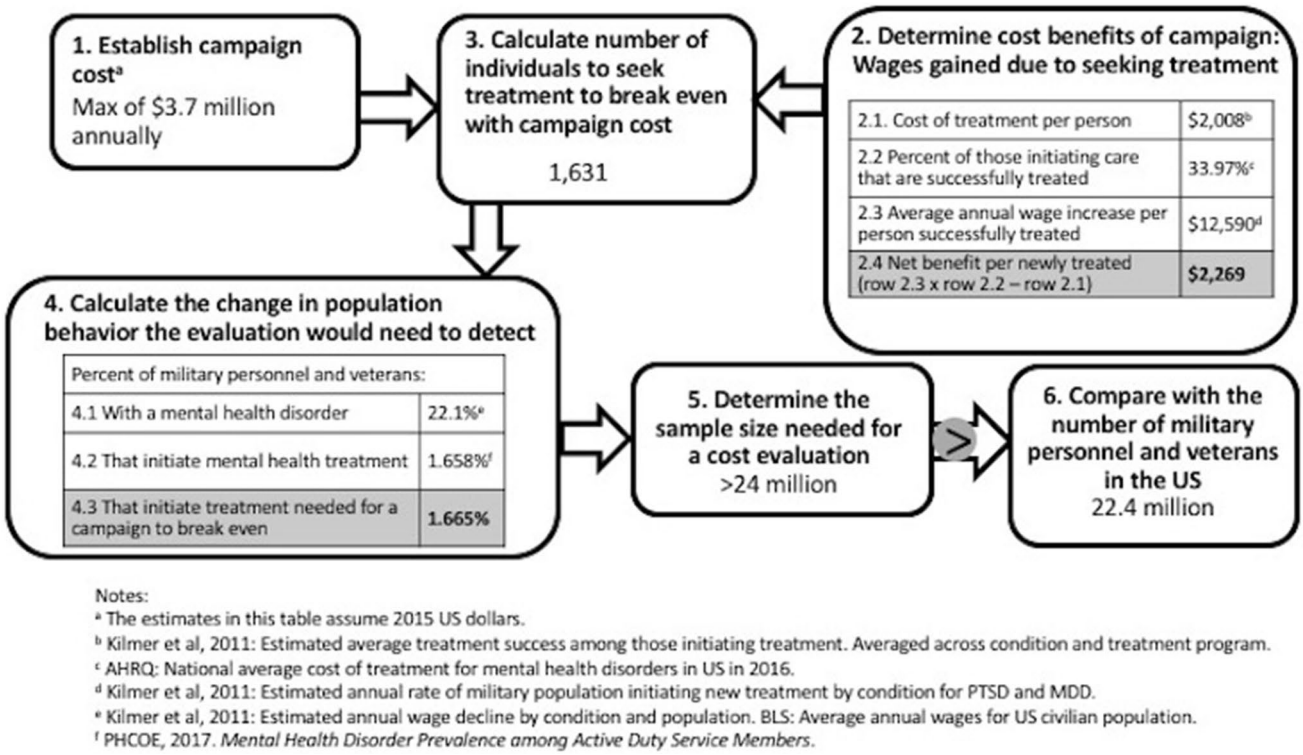

Fig. 1 Steps of the analysis and associated assumptions

point, assuming 80% power and a two-sided test with an alpha of 0.05.

Because of the reliance on cost data not linked to any individual, the Institutional Review Board (IRB) at the authors' institution determined that this research does not involve human subjects and thus did not require IRB oversight. For this type of study formal consent is not required. The authors have no known conflicts of interest.

Results

Figure 1 summarizes our net benefit calculation for a single campaign. The calculated net benefit per treatment seeker is $2269. The break-even point for a campaign is 1631 additional treatment seekers each year. This represents an increase of 0.007% in the number seeking treatment (increasing from 1.658 to 1.665% of the total U.S. military and veteran population). To detect an increase this small, more than 129 million U.S. military personnel would need to be surveyed, split between those exposed to a campaign and those who were not. However, this exceeds the entire U.S. military and veteran population, which in 2015 was an estimated 22.4 million (active duty, reserves, and veterans) (Psychological Health Center of Excellence, undated) (National Center for Veterans Analysis and Statistics 2017). Alternatively, we could try to sample just those service members and veterans exhibiting symptoms of a mental health disorder. In that case, the survey would need to detect an increase of 0.03% (7.5 to 7.53% treatment utilization). The sample of over 24 million required for that calculation still exceeds the entire U.S. military and veteran population.

Discussion

As a result of the analysis, we opted not to conduct a cost–benefit outcome evaluation. The required sample size was greater than the population available to sample, so an appropriately powered study was not possible, regardless of budget. In fact, our estimates of net benefits are conservative because they (1) use U.S. civilian wages, which are typically lower than active-duty pay, and (2) exclude the value of lives saved from suicide. Both would reduce the number of additional treatment seekers needed to break even, increase the sample size needed to detect cost-effectiveness, and would only further support the study findings.

Sample size and power are challenges for many evaluations like ours. Programs that would be cost effective even with very small effect sizes often cannot—or should not—be subject to an outcome evaluation because even an underpowered study can cost more than the program being evaluated. In our analysis, a study with just 10% power would still have required a sample of 7 million.

The risks caused by conducting a low-powered evaluation using standard statistical hypothesis testing are concerning (Gelman and Carlin 2014). For example, if a campaign was fully cost effective (e.g. 1631 additional treatment seekers) and we conducted a standard outcome evaluation with approximately 6% power and a "large" sample (N = 10,000), there are three possible outcomes: (1) a 94% chance it would (correctly) show a null result, (2) a 4% chance it would show the program increased treatment, and (3) a 2% chance it would (incorrectly) show the program decreased treatment. The study is almost as likely to conclude that the cost-effective program is harmful as it is to show that it is beneficial. By far the most likely outcome is a null result, which would be interpreted, at best, as inconclusive and, at worst, as evidence that the program is ineffective. In short, subjecting a program to such an evaluation is far more likely to harm the program or result in its termination than to provide support for it, even if it is fully cost-effective.

While we fully support increasing evidence-based public health programs and empirically evaluating them, subjecting programs to outcome evaluations that do not have adequate power may actually harm public health, rather than improve it. In areas where cost-effectiveness evaluations of media campaigns have been conducted such as smoking cessation and human immunodeficiency virus prevention, similar types of evaluations require nationally or statewide representative household surveys conducted across a period of years to look at trends in targeted outcomes (Brown et al. 2014; Lorenc et al. 2011). Funders, program designers, and evaluators need to find alternative ways to improve and assess the ultimate value of such programs.

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