THE ASSOCIATION BETWEEN ADVERTISING AND CALLS TO THE OREGON TOBACCO QUIT LINE

by

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ABSTRACT

To promote healthy behaviors, many organizations utilize telephone helplines. In particular, many states now have toll-free numbers that tobacco users can call to get help in quitting tobacco. Other research has shown that counseling from helplines can be effective at helping people quit tobacco. It has also been shown that radio and television advertising that includes a helpline telephone number generally increases calls to a helpline. However, very little is known about the effectiveness of alternate advertising strategies at getting people to call a helpline. Some research on "direct response" advertising in the business realm may be applicable to helpline advertising.

The main purpose of this study is to assess the cost-effectiveness of different advertising strategies at getting tobacco users to call the Oregon Tobacco Quit Line. Data are collected on each caller to the Quit Line, including caller demographics, stage of change, and how the caller heard about the Quit Line. Calls to the Quit Line go up immediately after radio or television advertisements begin and decrease to baseline levels within a few days after advertising stops.

Cost-effectiveness is measured by cost per call, calculated as dollars spent on an advertising buy divided by the number of calls to the Quit Line generated by that advertising buy. Daytime television is seven times more cost effective than evening televison and also more cost-effective than radio. The most effective advertisements are testimonials by people who lost a loved one to tobacco and advertisements that describe the benefits of quitting or how to quit. Other findings include: little or no seasonality in

the cost-effectiveness of media buys, the effectiveness of an ad does not decrease with repeated airings, and 90% of callers are in the preparation, action, or maintenance stages of change, and this does not vary by how they heard about the Quit Line.

Cost per call is an appropriate measure of the effectiveness of "direct response" advertising, such as advertising intended to get people to call a helpline. Helpline providers can use prior research to assist in planning their media buys, and they should monitor the number of calls to the helpline in order to assess the effectiveness of their advertising efforts.

Introduction

In the United States tobacco use is the leading preventable cause of death, leading to an estimated 440,000 deaths each year (Fellows et al. 2002). Tobacco use increases a person's risk of morbidity and mortality from many diseases, including cancer and heart disease. Currently, 25% of adults in the United States smoke cigarettes, and that percentage has not changed significantly in the past 10 years (U.S. Department of Health and Human Services 2000). Various studies have shown that quitting tobacco has beneficial health effects for users of any age, no matter how long they have been users (U.S. Department of Health and Human Services 1990).

In Oregon about three-quarters of smokers want to quit, and one-quarter of smokers are planning to quit in the next 30 days. Over 60% of smokers think that assistance, such as nicotine replacement therapy (NRT) or a smoking cessation program, would be helpful in quitting. But, in Oregon, only 5% of quit attempts include a smoking cessation program, and about 30% of quit attempts included NRT (Oregon Department of Human Services 2001). Tobacco users are more likely to successfully quit if they get some kind of assistance (Zhu et al. 2000b). Although even the best tobacco cessation programs have success rates of less than 50%, the immediate and long-term reductions in morbidity and mortality make tobacco cessation programs one of the most cost-effective prevention programs (U.S. Public Health Service 2000).

Many studies, including a randomized control trial (Ossip-Klein et al. 1991), have shown the efficacy of telephone helplines for helping people quit tobacco. A 1996 meta-analysis of studies concluded that, "While difficult to evaluate, [tobacco helplines] appear

to be efficacious and useful as a public intervention for large populations" (Lichtenstein et al. 1996). More recent studies have bolstered the conclusion that telephone support increases tobacco cessation (Borland et al. 2001; Owen 2000; Zhu et al. 2000c; Wakefield and Miller 1999; Platt et al. 1997; Mudde et al. 1995).

Quit lines are usually targeted towards tobacco users who are planning to quit. Callers to a quit line may receive various assistance in quitting, including telephone counseling, quit kits, referrals to other tobacco cessation programs, or even access to free NRT. Some of the barriers to other types of cessation programs that might not be an issue with quit lines include transportation and, to a lesser extent, childcare. Quit lines also offer a higher degree of confidentiality than group cessation programs. Some people may prefer quit lines because they offer one-on-one counseling with a person they will probably never meet. Quality assurance and the staff's adherence to cessation protocols is easier at a quit line because the staff, working at computers, are inputting and receiving information about protocols in real time.

Statewide Tobacco Quit lines

In 1988, voters in California passed an initiative to increase tobacco taxes and dedicate 20% of the new funds to tobacco prevention programs. In 1990, researchers at the University of California at San Diego obtained funding from the California Department of Health Services to develop and test a telephone-based cessation service. In the California study, helpline callers were randomly assigned to one of three treatment groups: (1) receipt of a mailed packet of quitting materials, (2) the mailed packet and a

single telephone counseling session, and (3) the mailed packet and multiple telephone counseling sessions.

The researchers found significant differences in one-year continuous abstinence by treatment group: mailed packet only (14.7%), single counseling session (19.8%) and multiple counseling sessions (26.7%) (Zhu et al. 1996). "The study not only demonstrated efficacy, but also showed that it was possible to bridge the clinical and public health approaches to smoking cessation. In other words, a helpline could combine the high efficacy of an intensive clinical program with the broad reach of a public health program" (California Department of Health Services, 2000). After the success of this study, California appropriated funds to begin the first statewide tobacco quit line in 1992.

In 1996, voters in Oregon passed Measure 44, which raised tobacco taxes and dedicated 10% of the new revenue to tobacco prevention. Oregon's comprehensive tobacco prevention program is run by the Department of Human Services, Health Promotion and Chronic Disease Prevention Program. The tobacco control program's annual budget is approximately $8.5 million. The comprehensive program works through local coalitions in all 36 counties, competitive grants to about one-third of Oregon schools, grants to tribes and multicultural programs, a mass media campaign, and linkages to cessation programs. In late 1998, the Oregon Department of Human Services contracted with Group Health Cooperative to run a statewide tobacco quit line. More than thirty states now have statewide tobacco quit lines, usually funded by tobacco taxes or by money from the Master Settlement Agreement (MSA) between the states' attorneys general and the tobacco companies.

These statewide tobacco quit lines are accessible to almost everyone in a state, since most people have a telephone and the service is free. There is an economy of scale as compared to a quit line that services a smaller geographic area or a subset of tobacco users (e.g., only pregnant women who use tobacco). Studies of quit lines in workplaces (Kinne 1991) and at a health maintenance organization (Glasgow et al. 1993) found that recruiting smokers to use a quit line was very inefficient with a small population of smokers. The Glasgow study concluded that "the lesson learned from this experience is that help lines appeal to a very small minority of potential users and need to be marketed to very large populations to be cost-effective."

Quit lines can be designed to offer a number of other advantages, such as referrals to other cessation support services. Quit line staff can assist callers in determining what other cessation services might be beneficial to them. Quit lines can maintain databases of cessation resources around the state and provide appropriate referrals to callers. A quit line can also keep a database of cessation services that are covered by the different health plans so callers can easily find out what cessation programs are covered by their health insurance. Cooperation between a quit line and health insurance companies can make signing up for additional cessation programs, including health insurance payment for those programs, easy for the tobacco user.

When people call the Oregon Tobacco Quit Line (OTQL), quit line staff first determine why the person is calling and categorize callers as information only, proxy, or tobacco users. "Information only" callers are often health care providers or people who work or volunteer in the area of tobacco prevention. These types of callers may want to

know how the OTQL works and what protocols are used when a tobacco user calls. "Proxy" callers are those people who are interested in helping someone they know quit tobacco. These callers are given advice on how to assist tobacco users in quitting.

Most of the people who call the OTQL are current or former tobacco users who want assistance in quitting or staying abstinent. Tobacco users who call the OTQL are categorized into a "stage of change" (Prochaska and DiClemente 1983) using the following questions:

> Have you already quit?
> Do you plan to make a quit attempt?
> Do you plan to make a quit attempt in the next 6 months?
> Do you plan to make a quit attempt in the next 30 days?

Callers who say they do not plan to make a quit attempt in the next 6 months are categorized in the precontemplation stage. Those who plan to make a quit attempt in the next six months, but not the next thirty days, are in the contemplation stage. Callers in the precontemplation or contemplation stages are given a brief intervention designed to move them along the stage of change continuum toward preparation to quit. Callers who plan to quit in the next thirty days, or have quit recently (and maybe relapsed) are in the preparation, action or maintenance stages. Callers in these stages are given counseling to assist them to quit or stay abstinent.

The minimum protocol for callers in the preparation/action/maintenance stages is a 15-20 minute telephone counseling session. Additional cessation support, including access to free NRT, is determined by the caller's health insurance status and participation in a study funded by the National Cancer Institute (NCI). Some health plans in Oregon offer

their members multiple telephone counseling sessions through the OTQL contractor. Callers with these health plans can automatically be signed up for the extended telephone counseling program called Free and Clear.

Callers without health insurance, or those with health insurance that does not cover the Free and Clear tobacco cessation program, can choose to participate in the NCI study. The NCI study is a randomized clinical trial seeking to determine the cost-effectiveness of different cessation support offered through a telephone quit line. Participants in this study are randomized into one of six groups in a 2x3 grid. On the "2-side" of the grid, study participants are randomly assigned to receive free NRT or no free NRT. On the "3-side", the treatments are (1) a 15-20 minute telephone counseling session, (2) a 40 minute telephone counseling session and one follow-up telephone call, and (3) the five-session Free and Clear program. Participants are contacted six months and one year after enrollment in the study to determine their tobacco use status.

Promotion of Helplines

A number of studies have been done, and are currently being done, to research the effectiveness of telephone quit line interventions. But very little research has been done on how to get people to call helplines. Various strategies are used to inform people about the helplines and to encourage them to call, including brochures, articles in the media, and referrals by health care providers. Studies of various health issues and in various settings have shown the effectiveness of mass media advertising at generating calls to a helpline. Examples include cancer information (Anderson et al. 1992), AIDS information, (Fan 1996; Liskin 1990), a helpline in Scotland to encourage walking

(Wimbush et al. 1998) and gambling addiction information in the United Kingdom (Griffiths 1999) and New Zealand (Sullivan et al. 1994). Advertising of tobacco cessation helplines has been shown to be effective in England (Owen 2000), Australia (Donnovan 2000), the Netherlands (Mudde and De Vries 1999) and the United States (Powers 2001; Zhu et al. 2000a; Cummings et al. 1993; Pierce et al. 1992; Ossip-Klein and Shapiro 1984).

Advertisements in the mass media have been shown to be effective at generating calls to helplines, but there has been very little research addressing the relative effectiveness of alternate advertising strategies. An Australian study indicated that the ad A Call for Help, which showed a person calling the quit line, was more effective than ads with graphic images of tobacco-damaged body organs (Donnovan 2001). Arizona ran a series of television ads in sequence over a five-month period where the main character moves through the different stages of change: precontemplation, contemplation, preparation and action. The number of Arizona quit line callers who requested cessation counseling increased as the advertisement's character moved towards the action stage of change (Powers 2001). In contrast, a study of the quit line in the United Kingdom found that "[T]he content of the advertising (for example, supportive or hardhitting) and the advertising mix (for example, television, or television, radio and magazine) appeared not to have influenced call volumes" (Owen 2000). This study did find a nine-fold increase in calls to a quit line when the non-free telephone number was replaced with a free telephone number. Another studies found that ads that do not mention the telephone number have no effect on generating calls (Pierce et al. 1992).

Direct Response Advertising

Many commercial businesses effectively use broadcast advertising to attract potential customers to call for more information or special offers; this is called direct response advertising (Bliwas 2000). Direct response advertising, as opposed to brand advertising, is making up a higher proportion of broadcast commercials (Lowry 2002). A recent study by Response Marketing Group showed that 29% of radio ads included a toll-free telephone number (Advertising Age 2000). The variety of businesses that are using direct response advertising is increasing, and now includes everything from weight loss products to financial services (Kerstetter 2000). Many marketing professionals predict that direct response advertising will be increasing in the coming years (Bliwas 2000).

Studies on the experience of for-profit businesses with direct response advertising may be helpful in designing advertising strategies for health-related helplines. These studies often use cost-effectiveness to measure the success of a direct response advertising campaign (Danaher and Green 1997). Cost-effectiveness can be measured as the advertising's cost per telephone call to the business or the cost per sales lead. There are numerous studies on the effectiveness of direct response mail campaigns, but there are few published studies on the effectiveness of direct response broadcast advertising. Most studies of direct response advertising in the broadcast media are limited because they use data from advertising campaigns that are not initiated by the researcher (Verhoef et al. 2000).

Studies of direct response TV advertising for commercial products indicate that the effects of direct response TV ads last for eight hours (Tellis et al. 1999). In fact, three

studies showed "that approximately 80 percent of phone responses occur within 20 minutes of an advertisement being aired" (Danaher and Green 1997). Response also diminishes over the life of a direct response campaign. As a New Zealand study summarized, "Most advertising response functions are concave downwards, exhibiting a diminishing return effect. DRTV ads are no exception. All [twelve] of our campaigns exhibited diminishing returns, so as a campaign proceeds through time, it is expected that fewer responses will be obtained" (Danaher and Green 1997). This conclusion was not supported by another study that showed that effectiveness does not decrease significantly with the length of a campaign and that cost-effectiveness does not vary with the frequency in which spots are aired (Tellis et al. 1999).

Longer advertisements are usually more cost-effective than shorter advertisements (French 2001; Johnson 1996), and more and more direct response advertising is using the "infomercial" format, which is generally 30-minutes long. For TV advertisements, it is more effective to have the telephone number on the screen for a longer time, preferably for at least 10 to 15 seconds (French 2001; Johnson 1996).

In general, lower rated (i.e., less popular) television shows are more cost-effective for direct response advertising (Levy 1999). Direct response advertising is more cost-effective in larger media markets than smaller markets (Tellis et al. 1999). At least some of this difference is the result of cost variation between markets. Generally, the cost per viewer or listener is higher in smaller markets. High involvement shows are less cost-effective, as it is theorized that viewers are less likely to take a break from viewing in order to make a telephone call (Danaher and Green 1997). Ads that use a voice-over

along with a visual of the telephone number are more cost-effective (Johnson 1996), and toll-free numbers generate more responses than telephone numbers where the caller has to pay (Johnson 1996; Radio Advertising Bureau 1997).

Studies have shown that ads placed in the daytime (9 a.m.-4 p.m.) are more cost-effective than evening programs (Tellis et al. 1999; Danaher and Green 1997; Johnson 1996). One study found that weekdays are more effective than weekends (Johnson 1996), and another study found, more specifically, that ad effectiveness declines steadily by day of the week (Tellis et al. 1999). A study in the Netherlands analyzed direct response radio commercials and found that days earlier in the week (Monday-Wednesday) are more cost-effective and that 2 p.m.-4 p.m. is the most effective time slot. Rush hour times are the least effective (7 a.m.-9 a.m. and 4 p.m.-6 p.m.) (Verhoef et al. 2000).

Direct Response - Calling a Quit Line

Advertising to influence tobacco users to call a quit line can be defined as direct response advertising. But there are no published studies that assess whether the research from the business realm, described above, is applicable to the direct response advertising for a health-related helpline. The studies from the business realm focus on the outcome of getting viewers to make a telephone call. State-level tobacco prevention programs air tobacco prevention advertisements to influence many things other than the action of calling a quit line. A recent review of the literature found that anti-tobacco mass media campaigns are effective at reducing tobacco use, even without increasing calls to a quit line (Hopkins et al. 2000).

For the audience of tobacco users, advertising the quit line service may give them more confidence to quit since they know that there is help if they need it. And tobacco users learn that the advertisement's sponsor thinks that quitting tobacco is important enough to offer free cessation services. Anti-tobacco advertising may also get tobacco users to believe that many people are quitting and encourage them to quit, even if they do not call the quit line.

For the population in general, quit line advertising can increase awareness of this service among health care professionals, educators, and others who may be in a positions to encourage tobacco users to call the quit line. Anti-tobacco advertising in general can be effective at changing norms to make tobacco use less socially acceptable. Advertisements can be used to educate people on the hazards of secondhand smoke and increase support for policies designed to protect people from secondhand smoke.

Some direct response advertising from the business realm is designed to have effects other than generating calls (usually to buy the product) to a toll-free number. But for most direct response advertising, the main response wanted is a call to buy a product. For a comprehensive tobacco prevention program, generating calls to a quit line may not be one of the most important goals.

Another difference between quit line advertising and direct response advertising from businesses is the focus purely on volume of calls or sales. A business wants to increase the number of sales of a product and generally does not care who is buying the product. The demographics and other characteristics of buyers can be used to target future

advertising and sales. But there is no change to "the bottom line" if the demographics of buyers mirrors the general population or not.

Policy makers and the public may think that a state tobacco quit line should target its promotions to the entire state: men and women, urban and rural, whites and racial/ethnic minorities, and people with disabilities. Advertisements may need to have a broad appeal, and it may be necessary to have additional advertisements targeted towards certain groups that may not respond to general market advertising. An advertising strategy could be designed to ensure that various groups are adequately represented among quit line callers even though the strategy is not the most cost-effective in terms of total calls to a quit line.

Specific Goals of the Study

Many organizations have telephone helplines and use advertisements (paid or public service announcements) to encourage people to call a helpline. In particular, many states now have, or soon will have, toll-free numbers that tobacco users can call to get help to quit. Not much is known about the relative effectiveness of alternate media strategies intended to get people to call helplines. The main purpose of this study is to assess the cost-effectiveness of different advertising strategies at getting tobacco users to call a quit line.

Many public health programs have limited resources, and it is important that they use these resources efficiently. This study will add to the limited current knowledge about the cost-effectiveness of various media strategies to generate calls to a helpline. This

information will provide important data for both governmental and non-governmental organizations wanting to make the most effective use of advertising dollars.

Methods

The main purpose of this study was to measure the cost-effectiveness of various advertising strategies for getting tobacco users to call the Oregon Tobacco Quit Line. Cost-effectiveness was measured by cost per call, calculated as dollars spent on an advertising strategy divided by the number of tobacco users who called the Quit Line from that advertising. This study also looked at the characteristics of callers from different advertising strategies and compared caller characteristics to the general population of tobacco users in Oregon. Data were analyzed from advertising buys and calls to the Quit Line from November 1998, when the Quit Line became operational, to March 2002.

Data on Ad Buys

Currently, almost all advertisements placed by Oregon's Tobacco Prevention and Education Program (TPEP) on television and radio include the telephone number for the Quit Line. Since the Quit Line become operational, most radio advertising has included the Quit Line telephone number. Television advertising that mentions the Quit Line did not begin until April 2000, with the exception of one test buy in November-December 1999.

The annual budget for airing radio and television ads is about $1.5 million. This study analyzed the cost-effectiveness of advertising strategies after Oregon produced the ad or obtained the rights to an ad. Oregon usually does not produce its own commercials, but

uses those produced by other state tobacco programs or the Centers for Disease Control and Prevention. Generally, the only costs for using existing spots are the royalties paid to the actors appearing in the ads. These fees tend to be small compared to the price of airing the ads. The costs used for this study include only the costs for general market buys. Some media buys are specifically targeted towards teens or an Hispanic audience (in Spanish). The costs of these buys are small compared to the general market buy. These targeted buys also tend to be less cost-effective, therefore the targeted buys result in very few calls to the Quit Line.

Data describing each advertising buy were collected from PacWest Communications, the media contractor hired by TPEP. An advertising buy is defined as an ad (or ads) running continuously in a particular medium (TV or radio). Ad buys are usually one or two weeks in duration, starting on a Monday and ending on a Sunday. The information collected for each ad buy includes:

Dates aired
Cost of buying advertising time
Broadcast medium: television or radio
Air times for television: daytime or evening
Geographic location of buy
Advertisement(s) aired
Whether Quit Line number was included in ad
Information on ad buys in different mediums during same time period

Before this study was proposed, the TPEP usually ran advertisements two at a time. For example, during an ad buy, half the air time would be used by one advertisement and half the air time by another. The broadcast stations rotated the ads throughout the ad buy. When ads are run in pairs like this, it is not possible to infer which ad prompted a call to

the Quit Line. Callers to the Quit Line are asked whether they heard about the Quit Line from TV or radio; they are not asked which ad they saw.

In order to undertake this study, the TPEP agreed to air only one advertisement at a time in any given medium (radio or television) from March through June 2001. The TV advertisements run during this phase were limited by TPEP's prior media strategy. It was not possible to select additional advertisements to run during this "single ad" period because there would be additional talent fees. To secure the cooperation of TPEP to do this study, it was agreed that no additional costs would be incurred. Later in 2001, TPEP's media strategy included running some TV ads by themselves, so a total of 20 TV ad buys included a single ad. Unfortunately, the radio ad buys were not changed during early 2001, and radio ads have always run two at a time.

Data on Quit Line Callers

Data were gathered on all callers to the Quit Line, including how they heard about the Quit Line, tobacco users' "stage of change", and their demographics. In 2001, 7,900 tobacco users called the Quit Line, with 3,814 of them hearing about the Quit Line from radio or television. The Quit Line database at Group Health Cooperative (the operators of the Quit Line) contains information that could personally identify callers, including first names, telephone numbers, and sometimes health insurance information. These identifying data were stripped before the data set was sent to TPEP for analysis, so caller anonymity was assured. The managers of the Office of Disease Prevention and Epidemiology of the Department of Human Services decided that this study did not need

approval from an Institutional Review Board. The data were sent in a comma delimited text file and then imported in SPSS 9.0, adding appropriate data labels.

Besides comparisons on cost per call, ad buys were compared on the characteristics of Quit Line callers. For example, it is important to know if a particular advertising strategy is more effective for generating calls from tobacco users in the preparation/action/ maintenance stage of change compared to precontemplation/contemplation stages of change. Differences in the demographic characteristics of callers may also be important. The following data were available on Quit Line callers. All data were self-reported by the caller, except for date of call.

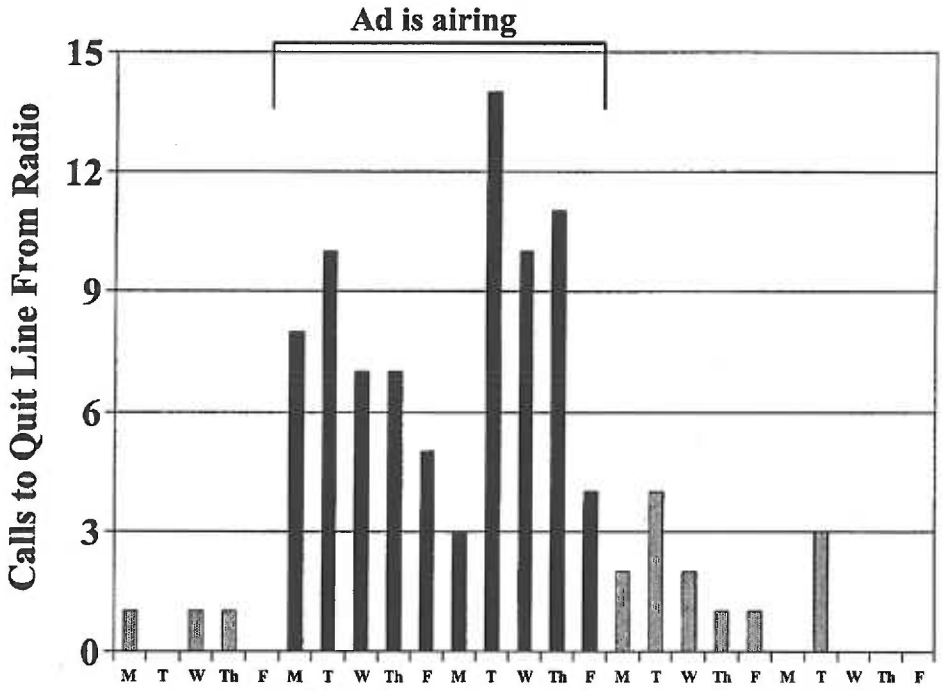
Gender
Birth date
Race/ethnicity
Highest level of education
Zip Code
City
County
Type of caller (tobacco user, proxy, information only)
Stage of change for tobacco users
Type of tobacco used
Source of knowledge about the Quit Line
Date called the Quit Line

Some callers have missing data for one or more of the variables listed above. The percentage of missing values for tobacco users are: type of tobacco used (1%), stage of change (8%), gender (1%), birth date (8%), education (19%) and race (19%). For this study the percentage of callers with a particular characteristic was calculated after excluding the cases with missing data.

Assigning Callers to Ad Buys

How a caller heard about the Quit Line is coded into broad categories, such as television, radio, referral from doctor, and brochures. Quit Line callers seem to be accurate at describing how they heard about the Quit Line. The number of callers who say they heard about the Quit Line from sources other than advertising does not increase when an advertisement is airing.

Figure 1
Callers who Heard about the Quit Line from Radio
Before, During, and After a Radio Ad Buy (10/29/01-11/18/01)



The effect of television and radio advertising is immediate and dissipates quickly when the ads stop running. Figure 1 shows the number of callers by day for a five week period, including one week before and two weeks after a radio ad was aired. The week

before the ad aired, an average of less than one caller per day said they heard about the Quit Line from radio. During the two weeks of radio ads, there was an average of 10 callers per day from the radio ads. The following week, when no radio ads were airing, there was an average of 2 callers per day who heard about the Quit Line from radio, and then less than one caller per day the following week. The data in this chart indicate that callers tend to call soon (at least within a day or two) after hearing an ad. In addition, anecdotal information from Quit Line staff indicates that people call soon after seeing or hearing an advertisement.

For each medium (TV or radio), Quit Line callers were aggregated by week, and the data imported into Excel 2000. The data on ad buys, including costs and advertisements used, were then added to the spreadsheets. Assigning callers to an ad buy is straight forward when there is a first week without ads, followed by an ad buy, and then a week without ads. In these cases, callers during the ad buy and the one week following were assigned to that ad buy. There are 6 such cases with TV ad buys and 27 such cases with radio ad buys.

Calculating the Number of Delayed Callers

Delayed callers are defined as callers assigned to an ad buy who called after the ad finished airing. In the six TV buys, the percentage of delayed callers were 6%, 8%, 11%, 11%, 12%, and 14%, for an average of 10% (95% confidence interval: 7%-13%). For the 27 radio ad buys, delayed callers averaged 14% with a standard deviation of 4.5% (95% confidence interval for average delayed callers 12%-17%).

Most of the TV ad buys and a few of the radio buys were directly before and/or after another ad buy. In these cases, a calculation of delayed callers was made in order to determine the total callers from each ad buy. Based on the data above, it was assumed that 10% and 14% of the total callers called in the week after the ad stopped airing on TV and radio respectively. An example of the assignment of callers to ad buys is described in Appendix A.

In the study data, there are four cases of TV ad buys where the calculated delayed callers were greater than the actual callers in the week following the ad. In these cases, the actual number of callers from the following week were assigned to the ad buy, thus making the delayed callers less than 10% of the total assigned callers.

Additional analyses were done assuming that the percentages of delayed callers were at either the high or low end of the 95% confidence interval for the average delayed callers (7%-13% for TV ad buys and 12%-17% for radio ad buys). Under these assumptions, the cost per call for ad buys changed an average of 2% but did not affect the conclusions of the study.

When no ads had been aired for a while, there were still Quit Line callers who said they heard about the Quit Line from the broadcast media, usually around 2-3 callers per week. These callers may have heard about the Quit Line from the media, but from non-advertising sources such as news stories or commentaries. They may have been callers who decided to call weeks after seeing an advertisement. There may also be errors in data collection, where callers mis-remember how they heard about the Quit Line, or the Quit

Line staff mis-codes the callers' responses. The analyses of this study did not make adjustments for this small amount of "background noise."

Calculating Cost-effectiveness

For each ad buy, data were collected on the cost of the ad buy and the number of Quit Line callers generated by the ad buy after assignment of delayed callers. Cost-effectiveness, as measured by cost per call, was calculated as dollars spent on an ad buy divided by the number of calls to the Quit Line generated by that advertising.

Data for similar ad buys were aggregated into ad buy groups for analysis. All radio ad buys and most television ad buys use two advertisements, making it difficult to calculate cost per call for any one advertisement. But three television advertisements were aired singly with a minimum of one daytime buy and one evening buy. For each of these three advertisements, cost per call was compared for daytime versus evening buys. For both daytime TV and evening TV, five ads were run by themselves. So, within each time of day, cost per call for five different ads were compared. Additional inferences were made on the cost-effectiveness of different ads by analyzing ad buys that used two ads.

Calculating Statistical Significance

Within any analysis, all possible pairwise comparisons between ad buys were made. P-values for statistical significance were calculated using the goodness-of-fit chi-square statistic (Fleiss 1981). The critical p-value for statistical significance was calculated using the Bonferroni adjustment. The Bonferroni adjustment is the most conservative adjustment generally recommended for use when multiple comparisons are being tested (Daniel 1999).

The example in Table 1 shows the data that were used in calculating the chi-square statistic and p-value for a cost per call comparison between Funeral and Quitting Takes Practice when these ads were aired during daytime TV. A total of $23,324 was spent on two ad buys using Funeral, and these buys generated 260 calls to the Quit Line. There were six ad buys using Quitting Takes Practice: $91,906 was spent on these ad buys, and 1,318 calls were generated.

Table 1
Example of Calculation of Chi-Square Statistic for a Comparison between Two Ad Buy Groups

	Costs	% of Total Costs	Observed Calls	Expected Calls	Cost per Call
Funeral	$23,324	20.24%	260.44	319.56	$89.56
Quitting Takes Practice	$91,906	79.76%	1,318.32	1,259.20	$69.71
TOTAL	$115,230	100.00%	1,578.76	1,578.76	

The null hypothesis is: the cost-effectiveness of the two ads are the same. The alternative hypothesis is: the cost-effectiveness of the two ads are different. If the cost-effectiveness of the two ads are the same, then the expected proportion of calls from Funeral would equal the proportion of dollars spent on Funeral. Since 20.24% of the costs are on Funeral, 20.24% of the total calls, or 319.56 calls, are expected from Funeral. When the same calculation is done for Quitting Takes Practice, the expected number of calls is 1,259.20. The data for observed and expected calls were entered into Excel 2000 and the chi-square statistic is calculated as 13.714. With one degree of freedom, the p-value is 0.0002.

This same type of goodness-of-fit chi-square test can be done within similar ad buys to determine if one or more ad buys has a cost per call statistically significantly different from the others. Table 2 shows the data for the six daytime TV ad buys that used Quitting Takes Practice.

The null hypothesis is: the cost-effectiveness of all six ad buys is the same. If the cost-effectiveness of the six ad buys is the same, then the expected proportion of calls from an ad buy is the same as the portion of money spent on that ad buy. With the data for observed and expected calls, the chi-square statistic is 16.200. With five degrees of freedom, the p-value is 0.006.

Table 2
Example of Calculation of Chi-Square Statistics for Comparisons Among Multiple Ad Buys within an Ad Buy Group

	Costs	% of Total Costs	Observed Calls	Expected Calls	Cost per Call
Quitting - Buy 1	$34,488	37.53%	450.00	494.70	$76.64
Quitting - Buy 2	$8,636	9.40%	122.33	123.88	$70.61
Quitting - Buy 3	$22,032	23.97%	373.74	316.03	$58.96
Quitting - Buy 4	$8,950	9.74%	117.81	128.38	$75.98
Quitting - Buy 5	$8,950	9.74%	121.11	128.38	$73.91
Quitting - Buy 6	$8,850	9.63%	133.33	126.95	$66.39
TOTAL	$91,906	100.00%	1,318.32	1,318.32	$69.71

The next step is to determine which of the six ad buys might be different from the others by partitioning the chi-square. Each ad buy can be compared to the sum of the other five ads buys, and, as described above, the chi-square statistic and p-value can be

calculated. Using this method, the p-value for ad buy #1 is 0.01 and the p-value for ad buy #3 is 0.0002. The other four ad buys are not statistically significantly different from each other.

Nineteen (19) ad buy groups contain more than one ad buy (see Appendix B). Some ad buys were aired multiple times over a period of time as long as eight months. Within an ad buy group, ad buys with and without certain characteristics were compared. For example, within an ad buy group, earlier ad buys were compared to the later ad buys. If there are two ad buys, the first ad buy is compared to the last ad buy by calculating the ratio of the cost per call. If there are three ad buys in a group, the first is compared to the last, and the middle buy is excluded. If there are four ad buys in a group, the first two are compared to the last two, and so on. Within ad buys, other variables were also studied, including seasonality and interaction with advertising from other media.

Analysis of Caller Characteristics

The variation of caller characteristics among ad buys was studied using descriptive statistics. Among ad buys, the percentages of callers with a given characteristic were compared and p-values calculated using the goodness-of-fit chi-square statistic. The analysis of caller characteristics did not make any adjustments for delayed callers. Given a small number of callers with any given characteristic, calculating delayed callers becomes difficult.

The interventions used by Quit Line staff are mainly targeted towards tobacco users in the preparation/action/maintenance stages of change. Thus, it is important to know the percentage of tobacco users who call the Quit Line who are in the preparation/action/

maintenance stages of change. Other caller characteristics that were studied included demographics and types of tobacco used.

Using descriptive statistics, characteristics of Quit Line callers were compared with the general adult population of tobacco users in Oregon. Comparisons were made to the adult population of tobacco users because only 2% of Quit Line callers are under 18 years old. Data on the general adult population of tobacco users were derived from the 2000 Oregon Behavioral Risk Factor Surveillance System (BRFSS), which includes 1,606 respondents who identified themselves as smokers and 187 as smokeless tobacco users.

Results

The primary analysis of the study data focused on the cost-effectiveness of alternate media strategies at generating calls to the Quit Line by tobacco users. Cost per call analyses can help answer important questions, including:

> Is an ad without the Quit Line telephone number effective at generating calls to the Quit Line?
> Is daytime TV more cost-effective than evening TV?
> Which advertisements are more effective at generating calls to the Quit Line?
> Is there any seasonality in the cost-effectiveness of ad buys?
> Is there any interaction between radio and TV buys?

Data for the Oregon Quit Line were consistent with previous studies that showed no increase in telephone calls when advertisements were aired that do not include a telephone number. During 1999 and the first three months of 2000, television ads were aired that did not include any mention of the Quit Line or a telephone number. The average calls per week from television was not significantly different when ads were

running than when ads were not running (calls per week: 2.0 versus 2.1, p=.99). The remaining analyses of this study included only ad buys that mention the Quit Line.

Cost-effectiveness of Ads Aired on Daytime TV

Five TV ads were aired by themselves during daytime TV buys (see Table 3). Because of the large differences in cost-effectiveness between daytime and evening buys (discussed below), ad buys in one day-part can only be compared with ads buys in the same day-part. Quitting Takes Practice (a.k.a. Quitting), Funeral, and Cigarette Pack are all ads that "speak" to smokers about quitting. Tina is a testimonial ad by a woman who lost her husband to cancer caused by smokeless tobacco. Bedroom has a secondhand smoke message and shows a man smoking in bed, exposing his wife to secondhand smoke.

Table 3
Cost per Call for TV Buys
Daytime

Ad	Cost per Call	Cost	Calls
Quitting Takes Practice	$69.71	$91,906	1,318.32
Funeral	$89.56	$23,324	260.44
Cigarette Pack	$143.41	$35,250	245.80
Tina	$144.45	$57,796	400.12
Bedroom	$164.96	$8,568	51.94
Quitting & Funeral	$104.42	$34,636	331.70
Quitting & Cigarette Pack	$149.19	$106,866	716.30
Debi/Voicebox & Cigarette Pack	$201.66	$67,225	333.35

Quitting Takes Practice was the most effective ad that ran during daytime TV. The next most effective ad was Funeral, which was 22% less cost-effective than Quitting Takes Practice ($p=.0002$, $\chi^2=13.714$, 1 d.f.). Cost per call for each of these two ads was statistically significantly different from each of the other three ads: Cigarette Pack, Tina, and Bedroom ($p<.0001$, $\chi^2=16.674$, 1 d.f.). The costs per call for these three less effective ads were not statistically significantly different from each other, and in general they were about one-half the cost-effectiveness of Quitting Takes Practice or Funeral.

Making inferences about the cost-effectiveness of particular ads was not as straight forward when two ads were run at the same time. A reasonable hypothesis for the interaction of two ads running at the same time is: cost per call for Ad A & Ad B running at the same time is the average of the costs per call for ad A and ad B. If this hypothesis is true, then the cost per call for Quitting & Funeral running at the same time would be the average of $69.71 (Quitting) and $89.56 (Funeral), or $79.64. But the data show a cost per call of $104.42, or 1.31 times the average cost per call for the two ads run separately. Similarly, the cost per call for Quitting and Cigarette Pack is 1.40 times the cost of the two ads run separately.

The other pair of ads that was aired at the same time was Debi/Voicebox & Cigarette Pack. In the two cases described above, on average, the cost per call for two ads running together was 1.4 times the average cost per call for two ads running separately. Under the assumption that the cost per call (cpc) for Debi/Voicebox & Cigarette Pack aired together is 1.4 times the average of Debi/Voicebox and Cigarette pack aired separately, the following equation holds:

$$\frac{\text{(cpc-Debi + cpc-Cigarette pack)}}{2} \times 1.4 = \text{cpc-Debi \& Cigarette Pack}$$

Using the data from Table 3, the cost per call for Debi/Voicebox was calculated at $145. Debi/Voicebox is a first-person testimonial by a woman with cancer who smokes through a hole in her throat.

Cost-effectiveness of Ads Aired on Evening TV

As with daytime TV buys, among ads running by themselves, Quitting Takes Practice was the most effective ad during evening buys (see Table 4). In this analysis of evening TV buys, there were a total of ten pairwise comparisons among the five ad buys that

Table 4
Cost per Call for TV Buys
Evening

Ad	Cost per Call	Cost	Calls
Quitting Takes Practice (Eugene, Medford and Bend only)	$437.80	$14,500	33.12
Debi/Voicebox	$503.05	$31,858	63.33
Funeral	$623.21	$35,099	56.32
Tina	$716.35	$34,048	47.53
Bedroom	$1530.25	$34,048	22.25
Quitting & Krystell Memorial	$282.88	$95,574	337.86
Living Room & Zack	$415.16	$159,314	383.74
Baby Smokers (no QL) & Quitting	$671.13	$231,914	345.56
Baby Smokers (no QL) & Cigarette Pack	$1,629.23	$108,898	66.84
Victim/Wife (no QL) , Debi/Voicebox, & Tina	$1,191.07	$126,468	106.18
Victim/Wife (no QL) , Debi/Voicebox, & Jeff	$1,246.61	$131,891	105.80

include one advertisement. To determine statistical significance, the critical p-value was 0.005 (0.05 ÷ 10) after the Bonferroni adjustment.

The cost per call for Quitting Takes Practice was statistically significantly different only from Bedroom. The difference in cost-effectiveness between Quitting Takes Practice and the other ads may be greater than observed in these data because Quitting was aired only in Eugene, Medford and Bend and not Oregon's largest city, Portland. The cost per viewer for the Portland market is about half the cost per viewer for a buy that includes Eugene, Medford, and Bend (Price 2002).

Bedroom, an ad with a secondhand smoke message, was the least effective with a cost per call that is statistically significantly different from each of the other four ads ($p \leq .0025$, $\chi^2 \leq 9.158$, 1 d.f.). Debi/Voicebox, Funeral, and Tina were not statistically significantly different from each other ($p \geq .06$, $\chi^2 \geq 3.428$, 1 d.f.).

Baby Smokers and Victim/Wife are both ads with secondhand smoke messages and neither mentions the Quit Line nor has the Quit Line telephone number. As discussed previously, when an ad buy included ads that did not mention the Quit Line, the ad buy did not generate calls to the Quit Line. From the daytime TV analysis, two ads airing together were less effective than each ad running separately by a factor estimated at 1.4. With these data, there was no way to know if the negative interaction held when one of the two ads did not mention the Quit Line. Table 5 shows the calculated cost per call for the four ad-combos that ran with Baby Smokers or Victim/Wife under two assumptions. The first assumption is that the cost per call for two ads running together is the average of the cost per call for each ad running separately. The second assumption is that the cost

per call for two ads running together is 1.4 times the cost per call of each ad running separately.

The cost per call for Quitting Takes Practice from Table 5 ($336 or $240) was less than the Quitting Takes Practice cost per call from Table 4 ($438), which could be because Quitting only aired in smaller markets when it aired by itself. The calculation of cost per call for Krystell Memorial from the Quitting & Krystell Memorial ad buy ($283) was complicated by the uncertainty in the cost-effectiveness of Quitting. Under the assumption of a 1.4 negative interaction for all ad buys with two ads, the cost per call for Krystell Memorial was calculated as $164, 31% lower than Quitting ($240). With the assumption of no interaction in buys with two ads, cost per call for Krystell Memorial was calculated as $230, also 31% lower than Quitting ($336). Krystell Memorial, a testimonial ad by a girl who loses her mother to smoking, was an effective ad, likely more effective than Quitting Takes Practice.

Table 5
Cost per Call for TV Buys Calculated from Buys that Included Baby Smokers or Victim/Wife

Ads	Cost per Call	
	No negative Interaction	**Negative Interaction Coefficient of 1.4**
Quitting Takes Practice	$335.57	$239.69
Cigarette Pack	$814.62	$581.87
Debi/Voicebox & Tina	$595.54	$425.38
Debi/Voicebox & Jeff	$623.31	$445.22

Living Room (a secondhand smoke message) and Zack (a testimonial by a boy who lost his father to tobacco) were only run as a pair. The Living Room & Zack ad buys were the second most effective combination after Quitting & Krystell Memorial. At least one of the ads was likely to be very effective. In this study, ads with secondhand smoke messages were less effective than testimonial ads. Thus, Zack may be a very effective ad.

Table 5 shows that Debi/Voicebox & Tina and Debi/Voicebox & Jeff had a very similar cost per call ($p=.74$, $\chi^2=0.110$, 1 d.f.). Thus, Tina and Jeff may be similar in effectiveness. Both of these ads are testimonials about a man who died from smokeless tobacco use and is survived by his wife (Tina) and son (Jeff).

Cost-effectiveness of Radio Ads

All radio buys for this study included two ads, except one buy that included three ads (see Table 6). Two ads, Secondhand Sound and Merman, do not mention the Quit Line

Table 6
Cost per Call for Radio Buys

Ad	Cost per Call	Cost	Calls
Secondhand Sound (no QL) & Lucky Rick	$1,053.23	$181,156	172.00
Secondhand Sound (no QL) & Tina/Graft	$654.89	$153,166	233.88
Merman (no QL) & Tina/Graft	$792.64	$139,504	176.00
Raspy & Lucky Rick	$407.69	$212,813	522.00
Raspy & Pinch	$403.50	$130,734	324.00
1 in 9 & Fatal Attraction	$712.58	$348,388	488.91
1 in 9, Tina/Graft, & Fatal Attraction*	$836.70	$210,012	251.00

*In larger markets, proportions were 1 in 9 (50%), Tina/Graft (25%), and Fatal Attraction (25%). In smaller markets, proportions were 1 in 9 (50%) and Tina/Graft (50%).

or the telephone number. To get an idea about the relative effectiveness of the ads, cost per call was calculated assuming that radio ads that did not mention the Quit Line generate no calls and that there was no interaction when two ads were aired together.

Secondhand Sound and Merman do not mention the Quit Line, and therefore were assumed not to generate calls to the Quit Line. Cost per call for Lucky Rick was calculated as half the cost per call of Lucky Rick and Secondhand Sound. The cost per call for Secondhand Sound & Tina/Graft was not statistically significantly different from the cost per call for Merman & Tina/Graft ($p=.06$, $\chi^2=3.671$, 1 d.f.). Therefore, the two ad buy groups were combined to calculate the cost per call for Tina/Graft. Cost per call for Raspy was calculated given the observed cost per call for Raspy & Lucky Rick and the calculated cost per call for Lucky Rick. Finally, cost per call for Pinch was calculated from Raspy & Pinch.

Table 7
Calculated Cost per Call for Radio Ads

Ad	Calculated Cost per Call
Raspy	$288.76
Tina/Graft	$357.02
Pinch	$518.24
Lucky Rick	$526.62

As shown in Table 7, under these assumptions the most effective ad was Raspy, which talks about the benefits of quitting smoking. Tina/Graft, a testimonial ad by the woman who lost her husband to smokeless tobacco, was the next most effective. Pinch (a slightly

humorous ad about the dangers of smokeless tobacco) and Lucky Rick (a first-person testimonial about the dangers of smokeless tobacco) were the least effective of the four ads. If there is a constant negative interaction when two ads are aired at the same time, the cost per call figures in Table 7 would change, but the order of effectiveness would not change.

Direct calculations of cost per call were not possible for the individual ads in the last two ad buys in Table 6, but some inferences may be made. Both the 1 in 9 & Fatal Attraction ad buy and the 1 in 9, Tina/Graft, & Fatal Attraction buy used 50% of the buy for 1 in 9. In smaller markets, the three-ad buy used 50% for Tina/Graft, and in the larger markets, 25% for Tina/Graft and 25% for Fatal Attraction. Since the cost per call was higher for the ad buy that included Tina/Graft and Fatal Attraction ($p=.04$, $\chi^2=4.286$, 1 d.f.), Fatal Attraction, which talks about the dangers of smoking, may be more effective than Tina/Graft.

Cost-effectiveness of Daytime versus Evening TV

Because of the large variation in cost per call for specific ads, any analysis of daytime versus evening TV must account for which ad is aired. Fortunately, there were three ads that ran buy themselves in both daytime and evening buys, as shown in Table 8. For each of these three ads, costs per call were statistically significantly higher when the ad ran during the evening versus daytime ($p<.0001$). The average ratio of cost per call for evening versus daytime buys was 7.1.

Table 8
Cost per Call for Television Ads
Daytime versus Evening Buys

Ad	Cost per Call		Ratio of Evening / Daytime
	Daytime	Evening	
Funeral	$89.56	$623.21	7.0
Tina	$144.45	$716.35	5.0
Bedroom	$164.96	$1530.25	9.3

Seasonality of Cost-effectiveness

Ad buys can be categorized into ad buy groups, with each group being homogeneous on advertisements used, medium, time of day, and media markets. Within each ad buy group, a chi-square goodness-of-fit test can determine which ad buys are statistically significantly different from the other buys in the same group. Generally, cost per call did not vary much when an ad buy was repeated several times (see Appendix B). Within each radio ad buy group, ad buys were not significantly different from each other on cost per call. But, seven TV ad buys were statistically significantly different from others in their respective groups. The starting dates of TV buys with statistically significantly higher costs per call were 8/14/00 and 10/8/01 while 5/8/00, 5/7/01, 11/13/00, 6/11/01, 1/7/02 had lower costs per call.

Looking at all ad buys around the dates listed above, no discernible pattern was found, except for ad buys in October. There were five ad buys during October, and all five were in October of 2001. These five October buys all had a cost per call higher than other buys in their respective groups, averaging 25% higher.

The Effect of Ad Repetition

The seven TV ad buys that were significantly different from other ad buys in their group showed no discernible pattern on how cost-effectiveness varied with repetition. Nineteen (19) ad buy groups contained more than one ad buy. For these 19 ad buy groups, the earlier ad buys were compared to the later ad buys. Of the 19 ad buy groups, 13 (68%) showed an increase in cost per call with repetition. The average cost per call for later ad buys showed a small (4%) increase compared to earlier buys.

Cost-effectiveness of one-week ad buys was compared to cost-effectiveness of multiple-week (two or three week) ads buys. There were six ad buy groups in this analysis (in the other ad buy groups, all ad buys were the same number of weeks). Four of the six groups had a higher cost per call for one-week buys versus multiple-week buys, and two of these differences were statistically significant ($p=.03$, $\chi^2=4.527$, 1 d.f. and $p<.0001$, $\chi^2=21.470$, 1 d.f.). The average ratio of cost per call for one-week buys versus two week buys was 1.1. There were not enough data to make a firm conclusion, but the data suggest that multiple-week buys may be more cost-effective.

More ads per day are aired in ad buys where more dollars are spent in a week. With the data in this study, no association was seen between cost per week and cost-effectiveness.

Interaction Between Radio and TV Buys

Six TV ad buys groups included both ad buys aired at the same week as radio buys and ad buys aired without radio buys. In four of these six cases, cost per call for TV ad buys was lower for buys aired the same weeks as radio buys, and in two cases cost per call was

higher when radio ads were also running. The ratios of cost per call for airing with radio to airing without radio were 0.86, 0.89, 0.95, 0.97, 1.07, and 1.12, for an average of 0.98.

There were two cases where radio ad buy groups included ad buys with and without simultaneous airing of TV ads. In these cases, the ratios of cost per call for airing with TV to airing without TV were .89 ($p=.20$, $\chi^2=1.636$, 1 d.f.) and .91 ($p=.41$, $\chi^2=0.687$, 1 d.f.).

Smaller Markets versus Larger Markets

The hypothesis that larger markets are more cost-effective could only be tested with one comparison in this study. All but two ad buys included both larger and smaller markets. There were two similar radio ad buys that varied only in that one buy included stations in large cities (Portland, Eugene, and Medford) and the other ad buy was in smaller markets. The cost per call for the large cities was $316.65 and, for smaller cities, $695.76 ($p<.0001$, $\chi^2=25.332$, 1 d.f.).

Analysis of Caller Characteristics

The second part of this study focused on the characteristics of Quit Line callers, including stage of change, type of tobacco used, and demographics. Characteristics of Quit Line callers were compared among ad buys and also compared to the general population of tobacco users from the 2000 Oregon Behavioral Risk Factor Surveillance System (BRFSS). There were no statistically significant differences in caller characteristics between callers from daytime television and callers from evening television. Therefore, when analyzing data by media, television callers included both those that called from daytime ad buys as well as evening.

Tobacco Use Characteristics

All ad buys had between 80%-100% of tobacco users in the preparation/action/ maintenance stages of change. On the BRFSS, about 25% of both smokers and smokeless tobacco users reported that they were "planning to stop in the next thirty days." This question was similar to the question asked of Quit Line callers to determine if they were in the preparation or action stages, "Do you plan to make a quit attempt in the next 30 days?" On the BRFSS, including respondents who quit tobacco in the last three months would only increase those in the preparation/action/maintenance stages by a few percentage points. Overall, 92% of Quit Line callers from both television and radio were in the preparation/action/maintenance stages of change, while 25%-30% of the general population of tobacco users were in the same stages of change ($p<.0001$).

Generally, ad buys that included an ad focusing on smokeless tobacco had a higher percentage of callers who used smokeless tobacco. Thirteen of the fifteen ad buy groups that did not include an ad focusing on smokeless tobacco had less than 10% callers who used smokeless tobacco. The only TV ad focusing on smokeless tobacco, Tina, had 39% of callers who used smokeless tobacco when the ad aired by itself. Tina/Graft, a smokeless radio ad, had 83% and 90% smokeless tobacco users when it was run with Merman and Secondhand Sound, respectively. When Secondhand Sound was aired with Lucky Rick, a first-person testimonial about smokeless tobacco, only 57% of callers used smokeless tobacco.

The difference in the effectiveness of the two ads could best been seen by comparing cost per call for smokers and smokeless tobacco users. Tina/Graft had a cost per call

from smokers that was more than twice that of Lucky Rick ($3179 versus $1222, $p<=.0001$, $\chi^2=17.500$, 1 d.f.). Lucky Rick had a cost per call from smokeless tobacco users that was more than twice that of Tina/Graft ($919 versus $365, $p<.0001$).

Caller Demographics

For the analysis of caller demographics, it would be better to compare Quit Line callers to BRFSS tobacco users who were in the preparation/action/maintenance stages of change, since the Quit Line intervention is targeted towards people in those stages of change, and over 90% of Quit Line callers are in those stages of change. As shown above, only 25%-30% of tobacco users were in the preparation/action/maintenance stages of change, so limiting the analysis to these BRFSS respondents would reduce the sample size substantially. Also, on the BRFSS there were no statistically significant differences in the demographic characteristics studied when looking at tobacco users in the preparation/action/maintenance stages of change versus tobacco users in precontemplation/contemplation stages of change. Therefore, the demographics of Quit Line callers were compared to the demographics of all tobacco users from the BRFSS.

Gender

In Oregon, 98% of smokeless tobacco users are men and 50% of cigarette smokers are men. Among radio buys, 70% of Quit Line callers were men. All but one radio buy group included a smokeless tobacco ad, and 93% of smokeless tobacco users who called from radio were men. Among the radio ad buys, 61% of smokers who called the Quit Line were men, and 39% were women ($p<.0001$). Looking at the television ad buy

groups, 41% of smokers who called the Quit Line were men, and 59% were women ($p<.0001$).

Race

Among smokers who called the Quit Line from television and radio buys, 3.3% were African American, 3.3% were Native American, and 0.8% were Asian/Pacific Islander. This compares to smokers in Oregon who are 1.2% African American, 3.3% Native American, and 1.3% Asian/Pacific Islander. African Americans were over-represented in the Quit Line callers by a factor of 2.7 ($p<.0001$). Native Americans had a proportionate representation among Quit Line callers, while Asian/Pacific Islanders were under-represented by a factor of 0.6 ($p=.002$).

Hispanic smokers were under-represented by a factor of 4 ($p<.0001$) among Quit Line callers. About 8% of cigarette users in Oregon are Hispanic, while only 2% of Quit Line callers were Hispanic. The Hispanic Quit Line callers included callers from additional Spanish language radio and television buys, as well as the general market buys. The Quit Line has a separate number for Spanish language callers.

The number of smokeless tobacco users in most racial/ethnic groups was too small to do an analysis by race.

Age

As shown in Table 9, the age distribution of smokers who called from TV was statistically significantly different from radio callers ($p<.0001$, $\chi^2=41.093$, 5 d.f.). A higher percentage of television callers who smoke were 18-24 years old, while a higher percentage of radio callers were 35-44 years old. Older smokers were under-represented

among Quit Line callers from both TV and radio; 18% of BRFSS smokers were 55 years or older, while only 8%-10% of Quit Line callers were 55 years or older.

Table 9
Cigarette Smokers by Age
Quit Line Callers and BRFSS Respondents

	18-24	25-34	35-44	45-54	55-64	65+	Total
Quit Line Callers-TV	20%	27%	25%	18%	7%	3%	100%
Quit Line Callers-Radio	14%	26%	32%	20%	7%	1%	100%
BRFSS	15%	22%	26%	19%	10%	8%	100%

Table 10
Smokeless Tobacco Users by Age
Quit Line Callers and BRFSS Respondents

	18-24	25-34	35-44	45-54	55-64	65+	Total
Quit Line Callers-TV	15%	46%	28%	8%	2%	1%	100%
Quit Line Callers-Radio	15%	48%	27%	8%	2%	0%	100%
BRFSS	21%	30%	22%	9%	11%	8%	100%

Table 10 shows the age breakdown among smokeless tobacco users for Quit Line callers and BRFSS respondents. The age distribution for smokeless tobacco users who called the Quit Line was similar for radio and television ($p=.34$, $\chi^2=5.671$, 1 d.f.). About 75% of Quit Line callers were 25-44 years old, compared to 52% among BRFSS respondents. Though 55 and older represent almost 20% of smokeless tobacco users, only 3% of Quit Line callers were in this age group.

Education Level

Tables 11 and 12 show the breakdown of smokers and smokeless tobacco users by education level. Education levels were higher for people who called from radio ads versus television ads for both smokers ($p<.0001$, $\chi^2=46.431$, 4 d.f.) and smokeless tobacco users ($p=.009$, $\chi^2=13.566$, 4 d.f.). Additionally, callers from radio ads had higher educational levels than tobacco users from the BRFSS, and this holds true for both smokers and smokeless tobacco users. The difference between Quit Line callers and BRFSS respondents was larger for smokeless tobacco users than for smokers. Among smokeless tobacco users on the BRFSS, those who planned to quit in the next 30 days

Table 11
Cigarette Smokers by Education Level
Quit Line Callers and BRFSS Respondents

	Less than HS Grad.	HS Graduate	Some College	College Grad.	Total
Quit Line Callers-TV	16%	37%	38%	10%	100%
Quit Line Callers-Radio	11%	29%	44%	16%	100%
BRFSS	18%	37%	30%	15%	100%

Table 12
Smokeless Tobacco Users by Education Level
Quit Line Callers and BRFSS Respondents

	Less than HS Grad.	HS Graduate	Some College	College Grad.	Total
Quit Line Callers-TV	8%	38%	39%	14%	100%
Quit Line Callers-Radio	4%	32%	43%	21%	100%
BRFSS	14%	38%	33%	16%	100%

had higher educational levels than those not planning to quit, though this difference was not statistically significant.

Callers Who are Not Tobacco Users

So far, the analysis has been limited to tobacco users who called the Quit Line. People also call the Quit Line just to get information or to get assistance in helping someone else quit (proxy callers). Information callers were 11% of the total callers from both television and radio advertising. Proxy callers were 8% of television callers and 9% of radio callers. Thus, tobacco users comprised about 80% of the total callers.

Among ad buy groups, the percentage of information callers showed no patterns. The percentage of callers who were proxy callers ranged from 0%-19% among ad buy groups. The four ad buy groups with the highest percentages of proxy callers were Tina-daytime TV (17%), Tina-evening TV (18%), Tina/Graft & Secondhand Sound (16%), and Tina/Graft & Merman (19%). For each of these four ad buys, the percentage of proxy callers was statistically significantly higher than the other ad buy groups ($p \leq .001$, $\chi^2 \leq 10.830$, 1 d.f.). Secondhand Sound and Merman do not have Quit Line messages. Tina television ads and Tina/Graft radio ads are both testimonials by a woman who lost her husband to smokeless tobacco. The proxy callers from these ads were 87% women, and 91% of these calls were about smokeless tobacco use.

Discussion

Although this study used only data from the Oregon Tobacco Quit Line, the results may be valuable to other states that are advertising Quit Lines, or to organizations trying

to generate calls to other types of helplines. The primary goal of this study was to evaluate the cost-effectiveness of various advertising strategies at generating calls to the Quit Line.

Cost-effectiveness of Different Media

The data were very clear that daytime television was more cost-effective than evening television by an average factor of 7, after adjusting for specific advertisements used. Some of the difference in cost-effectiveness between daytime and evening television ads can be attributed to the cost per viewer. In this study, cost per viewer for evening television buys was twice that for daytime television. Daytime television buys are generally less expensive than evening buys, and Oregon's daytime buys were purchased using direct response advertising prices. Direct response prices are less expensive because the buyer cannot select the times or television shows when the ads will run. The television station guarantees a certain number of viewers for a price, but the station determines what times the ads will run.

Viewer attentiveness may also help explain why daytime television is more cost-effective. Generally, evening television shows have higher viewer attentiveness, and media prices are higher accordingly. For brand advertising, high viewer attentiveness is an advantage. When looking for a direct response, lower viewer attentiveness may be an advantage. Viewers who are more engaged in a program may be less likely to stop watching and make a telephone call.

Some people who call after seeing an ad during evening hours may call after the Quit Line closes at 8 p.m. About half of the evening ads are aired after 8 p.m. When the Quit

Line is closed, callers may leave a number and Quit Line staff will attempt to reach them. After-hours callers were not included in caller counts if they chose not to leave a call-back number or if they were not able to be reached with a call-back.

An accurate cost-effectiveness comparison cannot be made between daytime television and radio because radio ads are not the same as television ads. But, the most effective television ad buy had a cost per call of $70, while the cost per call for the most effective radio ad was calculated as $289. Radio does have an advantage when an advertiser wants to target a particular demographic group because radio audiences tend to be more homogenous than television audiences (Mcpherson 2000).

Effectiveness of Specific Ads

The advertisements in this study were grouped into four basic categories: ads that use an actor to speak about the dangers of tobacco use or how to quit; ads that use testimonials by people who lost a loved one to tobacco; first-person testimonials where a tobacco user talks about the dangers of tobacco; and secondhand smoke messages. Three television ads were in the first category with messages about the dangers of tobacco or how to quit. The only ad that deals practically with how to quit is Quitting Takes Practice, which was very effective at generating calls to the Quit Line. The other two in this group were fairly effective ads – Cigarette Pack (where a father uses a picture of his daughter to encourage quitting) and Funeral (where a smoker decides to quit to prevent his early death). Funeral was almost as effective as Quitting Takes Practice, but Funeral has the Quit Line number showing for six seconds, while most TV ads have the number

up for only three or four seconds. Other research has shown that the longer the number is shown, the more responses the ad will generate (French 2001; Johnson 1996).

The testimonial ads Krystell Memorial and Zack were aired with other ads, so an accurate estimate of cost-effectiveness was not possible. But, the data suggest that these testimonial ads may be more effective than Quitting Takes Practice. Tina was the only testimonial ad that was aired by itself on television. Given that it deals with smokeless tobacco, it was a very effective ad, with a cost per call only twice that of Quitting Takes Practice. Tina/Graft was the most effective radio ad that deals with smokeless tobacco.

In each of these testimonial ads, a real person talks about the emotional impact of a relative's (mother, father, or husband) illness and eventual death by tobacco. The emotions are real and powerful, but the ads are understated in that they do not call for someone to quit tobacco, except for the Quit Line tag at the end of the ads. It may be more difficult for tobacco users to deny the message of the testimonials ads, as opposed to ads that talk about the health consequences of tobacco use. Some tobacco users may think that their health is only their concern, but the testimonial ads may help them understand the huge impact their death or serious illness would have on their family.

First-person testimonials about the dangers of tobacco were less effective than the testimonials of people who lost loved ones to tobacco. In first-person testimonials, real people who have suffered greatly from a tobacco-related illness give the message: I used tobacco and look what it did to me; you should quit so this doesn't happen to you. In the business realm, testimonials by people who used the product are an effective element of

direct response advertising (McCrea 2000). A similar technique for helplines would be a testimonial by someone who has quit tobacco after calling the Quit Line.

The least effective ads for generating calls to the Quit Line were those with a secondhand smoke message. But the dangers of secondhand smoke may be one of the more important messages to get across to the general public, as well as to tobacco users. Exposure to secondhand smoke increases a person's risk for many serious diseases (National Cancer Institute 1999). Advertising about the dangers of secondhand smoke may increase support for smoking restrictions at home and in the workplace that provide protection from secondhand smoke. In addition, a recent review of the literature concluded that smokers reduce their cigarette consumption when their workplace becomes smokefree (Hopkins et al. 2000).

The ads in this study focused on either cigarette smoking or smokeless tobacco use. Among tobacco users on the BRFSS, 13% use smokeless tobacco. Thus, ads that target smokeless tobacco users versus smokers were generally less effective in terms of calls to the Quit Line. Some smokers called from smokeless ads and vice versa. Lucky Rick and Tina/Graft are both radio ads that focus on smokeless tobacco. Tina/Graft had a cost per call from smokers that was twice that of Lucky Rick, even though Lucky Rick had a cost per call for smokeless tobacco users that was twice that of Tina/Graft. This difference may be a result of the Quit Line tags. The Quit Line tag for Lucky Rick starts with "The Oregon Quit Line can help you quit tobacco..." while the tag for Tina/Graft starts with "If you chew and are having a hard time quitting call..." Listeners may interpret the Tina/Graft tag to mean that the Quit Line is only for smokeless tobacco users. Over half

the callers from the Tina television ad were smokers, and its tag starts "To quit, call..." An ad may generate more calls if the tag implies that the Quit Line is for all tobacco users and not specifically for smokers or for smokeless tobacco users.

Seasonality

In general, the cost-effectiveness data in this study did not show any seasonality. Clearly, there is seasonality in television viewership, such as fewer viewers during the summer and other times when regular programming is "repeats". But these differences in viewership are factored into the pricing structure for ad buys.

Since this was a tobacco helpline study, one hypothesis is that the cost per call would be lower around the first of the year, when many people make resolutions to quit. However, cost per call was not lower for ad buys around New Years. The increase in users attempting to quit may be offset by the difficulty in finding time to call during a busy time of year. Tobacco users who choose to quit around New Years also may be less inclined to want to call a Quit Line.

In the study data, the only increase in cost per call by season or month was found during October 2001. One hypothesis is that tobacco users were less likely to want to quit for a period of time after the attacks on the World Trade Center on September 11, 2001. Preliminary data from the 2001 Oregon BRFSS show that tobacco use prevalence (cigarettes, smokeless tobacco, or cigars) was 24.2% before September 11 and 26.4% after September 11. This difference is not statistically significant, but suggests that some people may have started using tobacco or, more likely, relapsed, after September 11. One explanation for the Quit Line call data would be that tobacco users were less likely to

want to quit, or at least less likely to call the Quit Line, for a period of time after Sept. 11, 2001.

Effect of Ad Repetition

Data from this study showed little or no effects on cost-effectiveness with ad repetition. The published literature on the effect of ad repetition is mixed. Some studies, including this one, may show no effect of ad repetition because the ad campaigns were small enough that advertising "wear out" was not reached. Within ad buys, there was a small (4%) increase in cost per call from earlier buys to later buys. This difference may be a result of inflation in media buy costs.

This study also showed no effect of ad repetition within a short time period, but this may be because of a lack of variance in ad repetition among media buys. The lack of an observed association may be a result of the small variation in cost per week in these data. For daytime TV, 85% of ad buys cost $7,000-$9,000, and the other 15% cost $11,500-$15,000. For evening TV, cost per week was $25,000-$34,000. For radio, the costs were $19,000-$35,000, but there was almost no variation within each ad buy group.

Effectiveness of Two Ads Airing Together

A potentially important finding of this study was that the cost per call of two ads running together in daytime television was higher than the average of the costs per call for each ad running separately. Generally, direct response advertisers just air one advertisement, the one they think is the most effective. No published literature was found assessing the effectiveness of two direct response advertisements for the same product airing in the same time period. One study showed that it is more effective to have an ad

repeated in a short period (Johnson 1996). When an ad buy includes two ads, each ad receives only half the air time, which could reduce the effectiveness of the ad buy. The positive effect of ad repetition in the short term was not observed in this study though.

When trying to get across different messages (with the different ads), the audience may not internalize each individual message as well. The three ads from this study that showed the negative interaction were all categorized as ads that "spoke to smokers" about the dangers of smoking or how to quit. But the tone and basic message of each of the three ads is very different. The negative interaction could be even greater between a "how to quit" ad and an ad that has a message less liked by smokers, such as the dangers of secondhand smoke.

Caller Demographics

Among smokers, radio ads were more likely to get male callers, and television ads were more likely to get female callers. These differences in response by gender may be partially attributable to differences in media consumption. Among adults, men listen to 8% more radio in an average day than women (Radio Advertising Bureau 2001), while women watch 14% more television than men (Television Bureau of Advertising 2001). If the relationship between smoking and media consumption is the same for men and women, then 52% of the average radio audience who smoke are men while 55% of the average TV audience who smoke are women. The differences in audience make up does not fully account for the gender differences in Quit Line callers.

This study found that, in comparison to the population of smokers, African Americans were over-represented among Quit Line callers, while Asian/Pacific Islander and

Hispanic callers were under-represented. A study of callers to the California Quit Line by race found similar results, except for Hispanic callers (Zhu et al. 1995). In the California study, African Americans were over-represented by a factor of 2 while Asians were under-represented by a factor of 0.5. Hispanic callers in California were in proportion to the number of Hispanic smokers. Comparisons between the California and Oregon results should be made with caution because the California data includes all callers to the Quit Line, not just callers from advertising, and Quit Line promotion strategies in the two states may be different. Differences in the demographics of Quit Line callers may reflect differences in readiness to quit or other cultural factors that were not studied here.

Suggestions for Increasing the Effectiveness of Advertisements

The television ads in this study had the Quit Line number on the screen from three to six seconds with no voice-over of the number. Research from the business realm shows the importance of having the telephone number on the screen for a long period of time, and it is more effective to have a voice-over of the number as well (Johnson 1996). Keeping the Quit Line number on the screen longer and including a voice-over would likely increase calls from the televison advertisements. Additionally, all Quit Line tags should talk about tobacco use, not specifically smoking or smokeless tobacco use, so that all tobacco users think that they can call the Quit Line.

Expertise from the business realm might be useful when designing ads to encourage people to call a helpline. "In just about every response program for just about any product, the 'offer' is the single most important element in closing the deal and making the sale" (McAlevey 2001). Many of the radio ads recite the Quit Line number twice and

have a brief description of the Quit Line. For example, the Quit Line tag for Raspy, a radio ad about the benefits of quitting smoking, is: "When you decide to give up smoking, call 1-877-270-STOP. We'll guide you through the entire process. It's confidential, and the call is toll-free. Call 1-877-270-S-T-O-P, and make a difference in your life." But the TV ads in this study usually lacked a good "offer", that is, an enticing description of what happens when a tobacco user calls the Quit Line. In focus groups of smokers in Oregon, many people remembered seeing these ads, but said that they have not heard of the Quit Line. And, tobacco users who have heard of the Quit Line said that they do not know what they would get if they called the Quit Line (Oregon Department of Human Services 2002).

Suggested Cost-Effectiveness Studies

Additional experiments with Quit Line advertising could test some of the hypothesis generated by this study. Oregon's tobacco control program, and programs in other states, could conduct many of these additional cost-effectiveness studies at little or no additional media placement costs.

The data from this study suggest that testimonials by someone who lost a loved one to tobacco are the most effective ads at generating calls to the Quit Line. But testimonial ads about a loved one who died from smoking were never aired by themselves. To confirm the cost-effectiveness of these ads, they could be aired by themselves, so a direct calculation of cost per call can be made. In addition, all new ads could be aired by themselves, at least at first, so that accurate cost per call comparisons can be made among advertisements.

The data from this study did not show any effect of ad repetition in the short term, but this could have been a result of the small variation in media weights (i.e., media costs per week) among ad buys. An experiment can be designed to assess whether cost per call is affected by the weight of a media buy. For example, the calls generated by a three week ad buy costing a total of $30,000 ($10,000 per week) could be compared to the calls generated by an ad buy costing $30,000 that airs in one week. Also, it is important to continue to monitor calls to the Quit Line to see if cost per call increases over time when the same ad buy is repeated.

An interesting finding from this study was that two ads airing together had a higher cost per call than either ad airing by itself. This finding can easily be tested with other ad pairings. An experiment could be conducted where ad A is aired by itself for one week costing $10,000 and ad B is aired by itself for one week costing $10,000. Then, an ad buy costing $20,000 can be aired for a week using both ads A & B. In this experiment, ad A would be placed using the same costs in the A ad buy as well as the A & B ad buy ($10,000). Thus, any observed increase in cost per call for the A & B buy could not be because of the decreased repetition of any one ad.

Direct Response Advertising and Other Public Health Interventions

Organizations wishing to promote their health-related helplines can learn much from the research about direct response advertising. Other public health interventions may be able to benefit from direct response advertising as well. For example, an effective direct response campaign could be designed to get people to turn down the thermostat on their hot water heaters in order to prevent burns. An effective ad would have some

information about why it is important to turn down the thermostat, but would also have a "call to action" with instructions on how to turn down a thermostat. The main purpose of this direct response ad would be to get the viewer to immediately go turn down their thermostat.

Traditionally, direct response advertising is designed to elicit an immediate, one-time response from the viewer or listener. In the business realm, the direct response is usually a one time telephone call to buy a product. In recent years, some businesses have used direct response advertising to sell products that they hope customers will buy multiple times. In these cases, the advertisements are intended to elicit direct responses, such as accessing a web site or calling a telephone number, to get a free product sample or a discount coupon. The free sample or coupon makes it easy for customers to get the product the first time, and the business hopes they will turn into repeat customers. Many public health programs aim to affect repeated behaviors, for example, encouraging people to exercise daily. These types of public health programs might consider a direct response campaign to encourage the behavior one time, in hopes of making it a habit.

States who are promoting quit lines, indeed any organization that is promoting a helpline, should do an analysis of the effectiveness of their outreach efforts. Callers to the helpline should be asked how they heard about the helpline, and accurate records should be kept about the helpline advertising, including costs. This study and others have shown that many valuable insights can be found when analyzing such data. Organizations should consider doing short experiments at the beginning of a campaign in

order to determine the most cost-effective advertising strategies and to modify the campaign accordingly.

This study used advertising and caller data that was aggregated into time periods of ad buys that were at least one week long. Some of the studies in the business realm looked at call volume by each ad placement (Tellis 1999; Verhoef et al. 2000; Dannaher and Green 1997; Radio Advertising Bureau 1997; Johnson 1996). More detailed analyses can be done when the data are at the individual ad placement level, and not a week-long ad buy.

Direct response advertising is designed for an immediate response, usually a telephone call. However, advertising by state tobacco control programs should serve other purposes, including education on the dangers of secondhand smoke and increasing support for tobacco control policies. Calls to the helpline are the most easily measured outcome, but not necessarily the most important. Generating calls to a quit line may or may not be correlated with other desired outcomes, including changes in the public's behaviors, knowledge, or attitudes.

Limitations

An important limitation of this study is that only ten television and six radio ads with Quit Line tags were studied, though the ads contained a variety of messages and dealt with both smoking and smokeless tobacco use. This study found similarities in cost-effectiveness when ads were grouped by main message. Because of the small number of ads in this study, these findings could be spurious. Analyses of the effects of seasonality and ad repetition are limited by the small number of times that ad buys were repeated.

The Quit Line caller data are limited because callers who did not talk to a Quit Line counselor were not included in the data. When Quit Line staff are busy, or when the Quit Line is closed, callers listen to a recording and have the opportunity to leave a call-back number. A large response to an advertisement could result in some callers not reaching a Quit Line counselor right away. If the caller left a number and was called back, the caller was included in the data. If they chose not to leave a number or if Quit Line staff could not reach them, they were not included in the total callers.

There were likely errors in assigning Quit Line callers to ad buys. For many ad buys, the delayed callers were calculated as a fixed percentage of total callers, when the data show that there was a variance in the percentage of delayed callers among ad buys. Callers from news reports on radio or television were counted as callers from advertisements. (The Oregon Quit Line now differentiates between callers who heard about the Quit Line from television news and from television advertisements.) In this study, people who called more than a week after an ad stopped were either not counted or assigned to the wrong ad buy.

All the data on Quit Line callers were self-reported, other than the date called. In addition, some callers were missing data for some variables, especially demographic variables such as education and race/ethnicity.

The data on ad buy costs are limited because the analyses did not take into account the effects of inflation in media costs. Conclusions on the cost-effectiveness of ads that were not aired by themselves may be inaccurate because a direct calculation of cost per call for a specific ad was not possible.

This study is limited by a number of factors that may affect the generalizability of the findings. The setting for this study was a single state, Oregon, that has a comprehensive tobacco control program with an $8 million annual budget. The effect of helpline advertising may not be the same in a different setting. In addition, the response to tobacco quit line advertising may not be the same as the response to advertising for other types of helplines. The effect of advertising intended to elicit a direct response other than a telephone call may be different as well.

Summary and Conclusions

An important finding of this study was the large differences in cost-effectiveness among advertisements and among advertising media. Given an amount of money to promote a helpline, organizations can increase calls to the helpline by using the most effective advertising strategies. Helpline providers can use and build on the existing knowledge of direct response advertisers, as well as collect and analyze their own data to determine the most effective advertising strategies. Important findings from this study include that daytime television is the most cost-effective medium and the most effective ads for generating calls to the Quit Line are testimonials by people who lost a loved one to tobacco and ads that describe the benefits of quitting or how to quit.

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APPENDIX A
Hypothetical Example of Calculating Delayed Callers

The following is a hypothetical example of how callers are assigned to ad buys. This example assumes delayed callers are 10% of the total callers. If there were 45 callers during the weeks an ad buy was airing, it is assumed that there are 5 delayed callers, because the total callers were 50 (45+5) with 5 being delayed callers (5÷50=10%). The assumption that 10% of total callers are delayed is equivalent to the assumption that the number of delayed callers is 11.1% of the number of callers while the ad is running. Table 13 below shows an example of how callers are assigned to ad buys when three different ad buys are aired back-to-back.

Table 13
Example of Assigning Callers to Ad Buys
Assuming 10% Delayed Callers

Week		Observed Calls	Calls assigned to week before	Calls assigned from week after	Total Assigned Calls
1	no ads	3			
2	Ad Buy A	90	not applicable	10	100
3	Ad Buy B	55	10	5	50
4	Ad Buy C	50	5	5	50
5	no ads	7	5		

There were 90 callers during the week of Ad Buy A. If 10% of the total calls from Ad Buy A were in week 2, then 10 calls from week 2 are assigned to Ad Buy A (10÷100=10%). There were 55 calls during week 2 when Ad Buy B ran. Ten of these calls are assigned to Ad Buy A, leaving 45 for Ad Buy B. If 10% of Ad Buy B calls are

delayed until week 4, then 5 calls from week 4 are assigned to Ad Buy B, so Ad Buy B is assigned a total of 50 calls. Ad Buy C is assigned 50–5 = 45 calls for the week it airs. The delayed callers for Ad Buy C are 5, so the total callers assigned to Ad Buy C are 50. It is possible for the assignment of delayed callers to include fractions of a caller. For this study, fractions are rounded to two decimal places.

APPENDIX B
Cost Per Call - Average and Standard Deviation
by Ad Buy Groups

TV Buys

Ad Buy Group	Number of Buys	Avg. Cost per Call	Standard Deviation
Quitting Takes Practice - Daytime	6	$70.41	$6.78
Quitting Takes Practice - Evening (not Portland)	1	$437.84	--
Funeral - Daytime	2	$91.14	$7.20
Funeral - Evening	1	$623.20	–
Cigarette Pack - Daytime	2	$142.16	$12.87
Quitting Takes Practice & Funeral - Daytime	2	$105.52	$15.06
Quitting Takes Practice & Cig. Pack - Daytime	6	$165.09	$51.29
Quitting Takes Practice & Krystell Mem. - Even.	2	$280.76	$9.64
Cigarette Pack & Debi/Voicebox - Daytime	2	$198.11	$9.63
Debi/Voicebox - Evening	1	$503.02	–
Baby Smokers & Cigarette Pack - Evening	2	$1,805.80	$757.67
Baby Smokers & Quitting - Evening	4	$695.59	$132.21
Living Room & Zack - Evening	3	$415.77	$30.03
Bedroom - Daytime	1	$164.94	--
Bedroom - Evening	1	$1,530.18	--
Tina - Daytime	6	$169.23	$65.02
Tina - Evening	1	$716.38	–
Victim/Wife, Debi/Voicebox, & Tina - Evening	4	$1,248.76	$309.81
Victim/Wife, Debi/Voicebox, & Jeff - Evening	4	$1,397.88	$555.96

Radio Buys

Ad Buy Group	Number of Buys	Avg. Cost per Call	Standard Deviation
Secondhand Sound & Lucky Rick	4	$1,075.08	$184.42
Secondhand Sound & Tina/Graft	4	$682.02	$112.52
Raspy & Lucky Rick	4	$416.07	$62.50
Raspy & Lucky Rick - small markets only	1	$695.76	--
Raspy & Lucky Rick - large markets only	1	$316.65	--
Raspy & Pinch	3	$404.73	$27.77
Fatal Attraction & 1 in 9	9	$743.16	$163.68
Fatal Attraction, Tina/Graft & 1 in 9	3	$838.71	$51.12
Tina/Graft & Merman	2	$797.69	$89.74

Note: For an ad buy group that includes more than one ad buy, average cost per call does not equal the cost per call for the ad group used in the study analyses. For the study analyses, cost per call is calculated from the total costs and total calls for all ad buys in a group.