

Telephone counseling for smoking cessation: rationales and meta-analytic review of evidence

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Abstract

We review the various ways in which telephone counseling has been used in smoking cessation programs. Reactive approaches—help lines or crisis lines—attract only a small percentage of eligible smokers but are sensitive to promotional campaigns. While difficult to evaluate, they appear to be efficacious and useful as a public intervention for large populations. Proactive phone counseling has been used in a variety of ways. In 13 randomized trials, most showed significant short-term (3–6 month) effects, and four found substantial long-term differences between intervention and control conditions. A meta-analysis of proactive studies using a best-evidence synthesis confirmed a significant increase in cessation rates compared with control conditions [pooled odds ratios of 1.34 (1.19–1.51) and 1.20 (1.06–1.37) at short- and long-term follow-up, respectively]. Proactive phone counseling appeared most effective when used as the sole intervention modality or when augmenting programs initiated in hospital settings. Suggestions for further research and utilization are offered.

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Introduction

While smoking prevalence rates declined over the last decade and evidence indicates that most ex-smokers quit without the aid of formal cessation programs (Fiore *et al.*, 1990), many smokers continue to need and be interested in cessation assistance. Smoking cessation clinics or classes have been a traditional approach to meeting this need and while they continue to serve a useful purpose, it is clear that most smokers cannot or will not attend such programs (e.g. Lichtenstein and Hollis, 1992). Pharmacological treatment, especially nicotine replacement, is another major potential source of aid for smokers (Fiore *et al.*, 1994), but may be limited by the need to get a prescription from a physician, the costs involved of both physician visits and the product itself, and the inability or unwillingness of physicians to provide the necessary accompanying behavioral counseling and support (Lichtenstein, 1992). These considerations have led both investigators and practitioners to search for alternative ways to bring personalized cessation assistance to smokers in less intensive and more convenient ways. Telephone counseling appears to be an increasingly popular way of so doing.

Telephone counseling in the service of smoking cessation has been utilized in a variety of ways: to augment or provide relapse prevention for more traditional cessation clinics; to augment brief physician counseling either with or without nicotine replacement; as a helpline or crisis line available for temporary support for smokers quitting on their own or with minimal assistance; and as the sole or major treatment modality.

In this paper, we examine the various ways in which telephone counseling has been employed, considering both the rationales for so doing and the empirical evidence in support of efficacy where available. Relevant studies were located via several sources including a CD-ROM search of the *Psych Abstracts* and *Medline* databases, a letter to researchers known to be active in this field, and references cited in obtained articles. Two major modalities of telephone counseling are considered: reactive approaches using help or crisis lines wherein smokers call a designated number for information or assistance and proactive approaches where a trained counselor initiates calls to the smoker or ex-smoker. Our review is organized around these two modalities as well as several additional issues. We focus on studies where telephone counseling is either a major part of the intervention or is employed in a way such that its specific effects on treatment outcome can be assessed. Many other studies have used phone calls as one part of a multi-component intervention, but it is difficult or impossible to determine the role of phone counseling versus other components in intervention efficacy. Because the reactive approach to the use of the telephone historically was employed first, we begin there.

Reactive helplines

The essential features of a reactive helpline are the establishment of a dedicated phone line and advertising its availability to a targeted population of smokers. Helplines may offer recorded messages, personal counseling or a combination of both. The target population can range from a relatively small number of persons who are participating in some study or project of interest (Orleans *et al.*, 1991; Glasgow *et al.*, 1993), to multiple counties (Ossip-Klein *et al.*, 1991; Cummings *et al.*, 1993) or even the entire US (Anderson *et al.*, 1992). Key issues for reactive phone call systems are what proportion of the target population utilizes the helpline, whether total call rates are sufficient to justify hotline operation, what kind of assistance

is sought by what kind of smokers and the effectiveness of the help for those who seek it out.

Quitlines or helplines for smoking were originated in the 1970s. For example, an American Cancer Society sponsored quitline was implemented in San Diego (Saunders, 1978). Few calls were received until a television promotion caused a temporary burst of 600 calls. In the first empirical evaluation of telephone assistance, Dubren (1977) randomized 64 subjects who had watched a televised stop-smoking program and returned postcards indicating at least 24 h of abstinence to a recorded message service or to no additional treatment. Intervention subjects could call 24 h a day and listen to a rotating series of recorded 3 min motivational messages. At 1-month follow-up, 19 of 32 subjects (59%) in the telephone condition were abstinent compared to 11 of 32 (34%) in the control condition ($P < 0.05$). Of the 32 subjects in the telephone condition, 23 (72%) reported calling at least once and the mean number of calls across all 32 subjects was 7.6. This sample was obviously highly self-selected and motivated—they had watched the TV cessation program, mailed in postcards and quit for at least 24 h. In a later study with a larger sample size, however, Dubren (1978) found no post-treatment effect for recorded phone messages used as part of a self-help program.

A clinical report by Shiffman (1982) may also have encouraged the implementation of reactive helplines. Shiffman's helpline was aimed solely at maintenance—persons who had quit and were experiencing temptations or felt in danger of relapsing. Clinically experienced counselors fielded the calls which averaged about 30 min. The 'Stay Quit Line' was advertised through cessation clinics and media in the Los Angeles area and handled nearly 500 calls over 21 months. The 5–6 month abstinence rate was 37% for those who had a slip and 63% for abstinent callers who were tempted, but had not stopped at the time of the call.

Ossip-Klein and colleagues have conducted the most systematic work on reactive helplines. Initially, a collaboration between university investigators and the American Lung Association-Finger Lakes Region, Inc. led to the development of

'Freedom Line' (Ossip-Klein *et al.*, 1984), a service that provided a daily menu of brief recorded non-smoking messages. An early report showed that an ongoing, community-based promotion campaign significantly increased usage compared with promotion solely through ALA cessation programs, with newspaper articles appearing to be most productive in the short-term. A total of 2194 calls were received during the two community promotion months, compared with 776 calls over the 2 months of ALA promotions alone, from a population base of approximately three-quarters of a million residents. A subsequent sampling of caller preferences for hotline messages showed that supportive messages were rated most highly, followed by cognitive coping, positive health, behavioral coping, informational and negative health (Shapiro *et al.*, 1985). The hotline later added a personal counseling option, with call-backs offered to 'crisis callers' who were in danger of relapsing. Estimates of point prevalence abstinence for crisis callers were 34 and 26% at 6- and 12-month follow-up, respectively (Giovino *et al.*, 1986).

In a well controlled trial (Ossip-Klein *et al.*, 1991), 10 rural counties were randomized to either self-help materials only or the materials plus 'Freedom Line'. It was estimated that 4% of eligible smokers ($n = 1813$) in the target counties were recruited into the study. The combined program produced higher biochemically confirmed quit rates both at 12- and 18-month follow-up (18 months = 12.1 versus 7.6%, $P < 0.05$), using both counties and individuals as the units of analysis. Thirty-six percent of subjects in the hotline condition called at least once and 9% spoke with counselors (25% of hotline users). Quit rates were consistently higher for those who called. 'Freedom Line' served as a model for a similar statewide program in Oregon (B. Niblock, personal communication). The Oregon 'Smoke Free Line' received over 9000 calls in the 1992/93 fiscal year from an estimated 3000 different callers. Only 3.2% requested personal counseling; others were content with the recorded messages.

The 'Freedom Line' has also been extended to an

older population. In a pilot methods development study, Ossip-Klein *et al.* (1994) provided smokers ($n = 177$) aged 60+ with self-help manuals and information on 'Freedom Line', and then randomized these subjects to either two mailed prompts to call the 'Freedom Line' or two proactive calls over a 3-month period. No significant main effects were found for intervention, but there was a significant gender \times intervention effect with abstinence rates higher for males in the mailed condition, and for females in the proactive condition. Overall, 50.5% of subjects called the hotline at least once over the 1-year period and 24.5% (48.5% of hotline users) spoke with a counselor. Preliminary results suggest that the relative cost-effectiveness of the interventions varies by gender, with the preferred strategy dependent on the gender mix of the target population.

Cancer Information Service (CIS) studies

Several recent studies have utilized the National Cancer Institute sponsored CIS, a toll-free helpline for members of the public (and health professionals) seeking information about cancer treatment, diagnosis or prevention (Anderson *et al.*, 1992). The CIS provides interactive phone counseling guided by professionally prepared scripts. Between 1983 and 1990, smoking was the third most popular inquiry for the CIS with the more than 300 000 inquiries accounting for 12.8% of all calls. CIS callers tend to be white (88.5%), female (71.3%) and well educated (88.3% \geq high school), but no specific demographics are provided for smoking versus other types of calls.

Cummings *et al.* (1993) sought to use a media campaign aimed at women smokers with young children to increase calls to the CIS for quitting assistance. The study used a post-test only control group design with media markets as the unit of analysis. The 46 week campaign was composed primarily of specially developed public service announcements (PSAs) augmented by TV 'buys' so that the messages were aired during prime time. The purchased TV spots yielded marked increases in calls. The overall number of calls received was five times greater in the seven intervention markets

compared with their matched controls and 29% of the calls in the media campaign regions were from the target audience—mothers of young children—compared to 10% for controls.

Davis *et al.* (1992) evaluated the effect on quitting of the above program for mothers with young children in two CIS regions not included in the media study noted above. Callers were randomly assigned to receive one of three quitting guides, one of which was tailored to women with young children; all received stage-based counseling. During the 12-month recruitment period, 4475 smoking related calls were received by the two CIS offices and 19.5% were from the target audience. At 6-month follow-up, 1-week point prevalence abstinence was 12.5% and there were no differences among the three quitting guide conditions.

Thompson *et al.* (1995b) and Kinne *et al.* (1991) attempted to elicit calls from workers at four blue collar worksites. Because of very low response rates, enrollment was opened to Washington CIS callers and finally to the general public to increase enrollment. Ultimately, there were 382 callers, 29% of them blue collar. Subjects were randomized to receive either the pre-1987 CIS protocol or a revised version incorporating stage-of-change tailoring (DiClemente *et al.*, 1991). There were no differences between groups in quitting or progression to other stages of change likely because most smokers who call a helpline are ready to quit. Overall quit rates were 19.4% at 6 months and 18.8% at 1 year.

The results of the 'Freedom Line' and CIS studies suggest that helplines aimed at large populations can elicit many calls, but these calls represent only a small fraction of eligible smokers. In that light, the experiences of Glasgow *et al.* (1993) and McFall *et al.* (1993) are not surprising. Glasgow *et al.* (1993) used a variety of methods including six newsletters and face-to-face encouragement to market a helpline to 2148 adult smokers (and families) who were members of a large HMO participating in one of several randomized control trials (e.g. Hollis *et al.*, 1993). Callers had the option of listening to brief messages, choosing

among several longer tapes or talking to a counselor. Over 33 months of operation, only 305 calls were received and 71% of these were in response to a special promotion offering a free smoking cessation system retailing at about \$80. Exclusive of this promotion only 2.4% of eligible participants used the helpline. McFall *et al.* (1993) sent 10 newsletters promoting a phone hotline over a 6-month period to 1147 smokers who registered for a televised cessation program in the Chicago metropolitan area. Seven percent called the advertised hotline to either talk to a counselor or listen to a taped message. This was a much higher proportion than was found by Glasgow *et al.* (1993) (likely because these subjects were sufficiently motivated to join the cessation program), but was still too small for further analyses.

New technologies

Modern technology has produced new options beyond the simple recorded message or live phone counselor. An automated, interactive voice response format offers a large array of messages to match the caller's interests or stage of change (Burke, 1993). Such a system permits the caller to branch him/herself through a menu of messages. The program was offered in two California counties with a combined population of nearly 1.7 million. During a 12-month implementation period, 5345 callers used the system listening to 19 617 messages. Most callers (78%) stayed on through the complete sequence of messages. Reasons to quit, how to quit and local resources for quitting were the most frequently selected options.

Schneider *et al.* (1995) developed a 'Talking Computer' interactive system with the caller answering questions and thus making choices via a touch tone phone. The service was advertised in the New York/Connecticut area and at selected worksites until recruitment goals were met. Radio advertising and promotion produced the best response. Those who called usually did so again (83%) and those who called five times or more reported a 22% quit rate after 6 months. At this time, there is insufficient data to evaluate these new technologies.

Summary

These reports indicate that reactive helplines provide a resource that smokers can choose to use at their discretion. The studies reviewed indicate that a very small proportion of smokers make use of such services, a finding similar to that observed with multi-session cessation programs (Lichtenstein and Hollis, 1992; Lichtenstein and Glasgow, 1992). Data from the 'Freedom Line' studies indicate that approximately 75% of crisis callers are self-quitters who have not attended a formal program, suggesting that the reach of the hotlines may extend beyond the population targeted by cessation clinics (Giovino *et al.*, 1986). It is clear that media campaigns can markedly boost helpline usage (Saunders, 1978; Cummings *et al.*, 1993; Ossip-Klein *et al.*, 1984). Helpline programs that serve large population areas, e.g. CIS and 'Freedom Line', receive sizable numbers of calls and may be cost-effective. The CIS service deals with a broad array of cancer issues thus spreading the costs. Helplines do appear to be effective for those who use them (e.g. Dubren, 1977; Ossip-Klein *et al.*, 1991; Davis *et al.*, 1992).

Because there are very few studies with control groups, it is difficult to estimate the impact of helplines on cessation, although the one large, controlled trial found a positive effect (Ossip-Klein *et al.*, 1991). The data also suggest that small differences in program content—different phone protocols; different booklets—do not affect outcome, a result also found with more intensive face-to-face programs (Lichtenstein and Glasgow, 1992). Interestingly, when services offer the option of recorded messages or live counselors, most callers prefer the recorded message and do not request the counselor (Ossip-Klein *et al.*, 1991; B. Niblock, personal communication). Why this is so remains an intriguing question. Whether the callers' knowledge that counselors are available if needed contributes to a hotline effect is unknown.

It is also possible to merge reactive and proactive approaches. Callers to a reactive program may be asked if they would be willing to be called back, thus building in follow-up and accountability while leaving choice in the callers hands. Such a system

has been used in California using cigarette tax monies to support the program and is discussed below (Zhu *et al.*, 1996).

Proactive telephone calls

Proactive calls are initiated by intervention staff and may be utilized in a number of ways. The telephone calls may constitute the intervention *per se* or may be used as an adjunct to a cessation group program, a nicotine replacement program or an intervention initiated during hospitalization.

Adjuncts to intensive treatment: relapse prevention and recycling

One intuitively appealing use for telephone calls is to help maintain abstinence achieved during an initial cessation clinic or other intervention. Given that initial contact and program structure helps facilitate gains during treatment (Janis, 1983), it would be expected that continued contact should facilitate maintenance and reduce relapse. An older generation of studies, however, consistently failed to confirm this hypothesis [*cf.* reviews by Lichtenstein and Brown (1982) and Colletti and Brownell (1982)]. For example, Schmahl *et al.* (1972) found that subjects contacted every 2 weeks after rapid smoking treatment maintained significantly less well than did subjects contacted every 4 weeks. Post-treatment phone contacts in at least two other studies (Danaher, 1977; Colletti and Supnick, 1980) also did not lead to any improvement in relapse prevention. These early studies had relatively few subjects and telephone contacts were added to what had been relatively intensive cessation programs—often featuring an aversive component (rapid smoking). The telephone calls were not well described, but appeared to offer non-specific support for not smoking.

Two recent studies explored the role of telephone counseling after group cessation programs. Both, however, focused on 'recycling' smokers who had relapsed into initiating further quitting attempts. In the Lando *et al.* (1994a) trial with 1082 subjects, the clinic was an intensive 8-week program. At 24-month follow-up, 3 months after the termination

of telephone support, 7-day point prevalence abstinence rates were 35.4% for the telephone support condition and 30.3% for the comparison condition ($P = 0.08$). Considering only those subjects who quit on the quit night, 40% of intervention subjects and 34.3% of comparison subjects were abstinent at this point ($P < 0.08$). Considering only those subjects who failed to quit on the quit night, 18.6% of intervention and 7.9% of comparison subjects were abstinent at 24-month follow-up ($P < 0.06$). Unfortunately, at 34-month follow-up, 1 year after the conclusion of telephone intervention, differences between conditions no longer approached significance.

Following a 7 week group treatment program, Mermelstein *et al.* (unpublished observation) randomized subjects to receive either seven non-specific encouraging phone calls (mean = 5.8) or to tailored recycling phone calls in which the counselor worked collaboratively with the subject on identifying and overcoming barriers to achieving or maintaining abstinence. Subjects were assessed periodically up to 15 months after group treatment and there were no significant differences between conditions at any time point. There were, however, some interesting interaction effects as a function of gender and condition. The Recycling condition did better in promoting recycling after a failed quit attempt for women, and in preventing relapse for men, but the Standard condition was better in preventing relapse over the long-term among women. Taken as a whole, both older and more recent studies provide faint support for the effectiveness of post-cessation clinic phone calls for either relapse prevention or recycling.

Augmenting nicotine replacement therapy

Telephone calls may also be used to augment nicotine replacement therapy by providing support and behavioral counseling (Westman *et al.*, 1993). In an experimental test of this augmentation effect (Lando *et al.*, 1994b), subjects received nicotine replacement therapy and instructions on how to use it in a 75 min group orientation session which also addressed behavioral aspects of smoking abstinence. The subjects were then randomly

assigned to no additional support, referral to a toll-free helpline or referral to the helpline plus four outreach telephone calls. Virtually no one used the helpline. There were no differences between conditions at either 3- or 12-month follow-up, although the proactive calls produced about 5% higher cessation at 3 months. At 12 months, quit rates for the three conditions were all in the range of 20–22%.

In a 3×2 factorial design, Ockene *et al.* (1991, 1994) randomized patients (internal medicine or family practice clinics) to either advice-only, brief patient-centered counseling or to counseling plus prescription of nicotine containing gum, and within those conditions, to receive three follow-up counseling calls at monthly intervals or to no support. While there were significant effects for counseling plus nicotine gum at 12-month follow-up, there was no significant effect for telephone counseling. The 6-month point prevalence differences, however, were in the predicted direction: 13.9 versus 11.2%. Again, it appears that telephone counseling has limited usefulness when added to an intervention program. It is also possible, however, that the spacing of calls was not optimal.

Augmenting personalized written feedback

Prochaska *et al.* (1993) found no effect for proactive telephone counseling augmenting the effectiveness of stage-tailored written materials combined with an expert system generated written feedback program that was stage driven (DiClemente, 1991). In fact, there was a tendency for the telephone counseling to undermine the impact of the expert system feedback on this Rhode Island sample. An attempt to replicate this study with a Texas population (Prochaska and DiClemente, 1992) encountered logistical difficulties, but again found no significant effect for telephone counseling. In partial contrast, however, Curry *et al.* (1995) found that three telephone calls (within 3 months of the receipt of written materials) significantly augmented personalized feedback at 3-month follow-up, but not at 12- or 21-month follow-up. Curry *et al.* (1995) worked with a non-

volunteer sample recruited via telephone interviews and the phone calls had the most impact on precontemplator smokers.

Augmenting hospital initiated interventions

Several studies have employed telephone counseling—usually by nurses—to continue smoking cessation programs initiated during hospitalization (Pozen *et al.*, 1977; Taylor *et al.*, 1990; Ockene *et al.*, 1992; Stevens *et al.*, 1993; DeBusk *et al.*, 1994) and have found significant effects for intervention compared to usual care. None of these studies has isolated the role of telephone counseling *per se*, although it appears to have been the primary element in three. Taylor *et al.* (1990) randomized 173 patients who had been smoking before hospitalization for an acute myocardial infarction. The study was initiated in the hospital and thus is not a pure telephone intervention, but the major component appeared to be nurse initiated phone calls once per week for the first 2–3 weeks and then monthly for the next 4 months. At 1-year follow-up, the active intervention had a biochemically confirmed abstinence rate of 61% compared with 32% for controls; the infarction event itself is a powerful smoking cessation process. The research group essentially replicated this finding in a study aimed more broadly at coronary risk factor modification (DeBusk *et al.*, 1994). Twelve months after the infarction, cotinine confirmed smoking cessation was 70% for the special intervention patients and 53% for usual care. The hospital initiated program reported by Taylor *et al.* (1990) had a cost-effectiveness of \$220/year of life saved (Krumholz *et al.*, 1993).

Ockene *et al.* (1992) evaluated a similar intervention with patients who underwent coronary arteriography. As in the Taylor *et al.* (1990) and DeBusk *et al.* (1994) studies, intervention began in the hospital, but was largely implemented by means of an average of four telephone calls post-hospitalization. There were marginally significant differences between Special Intervention and Advice Only at 6-month follow-up (62 versus 51% self-report; 45 versus 34% validated), but not at

12-month follow-up (57 versus 54% self-report; 35 versus 28% validated). Logistic regression analyses did show that the primarily telephone intervention had the most effect for patients with the most severe coronary artery disease.

Telephone counseling as the primary intervention

Several studies have evaluated phone counseling as the primary intervention provided. In these studies, interested smokers may be recruited from HMO newsletter announcements (Orleans *et al.*, 1991), from callers to an advertised helpline (Zhu *et al.*, 1996), from worksites (Thompson *et al.*, 1995b) or from participants in prior programs (Lando *et al.*, 1992). Curry (1993) provides a brief review of telephone counseling in conjunction with self-help materials. Typically, participants receive written materials along with telephone calls. In two studies 'cold' calls were made to smokers identified through surveys (Lando *et al.*, 1992; Britt *et al.*, 1994). Smokers appear relatively receptive to unsolicited offers of phone counseling. In the Britt *et al.* (1994) study, 86% of smokers accepted at least one telephone call and 66% accepted all three calls. Choosing a quit method, motivation, stress, program efficacy, withdrawal and relapse were the most frequent topics discussed.

Two large randomized trials found significant results (Orleans *et al.*, 1991; Zhu *et al.*, 1996). Both studied self-selected smokers who sought out assistance. Orleans *et al.* (1991) randomized over 2000 HMO smoking subscribers to: (1) either self-quitting materials only, (2) the same materials plus written materials encouraging them to get social support, (3) the self-quit and social support materials plus four prescheduled telephone counseling calls, and (4) a control group which received only a minimal pamphlet. At both 8- and 16-month follow-up the telephone counseling yielded significant effects compared to the other three conditions which did not differ from one another. For example, 1-month point prevalence at the 16-month follow-up was 21.5% for the telephone counseling compared with 13.7% for self-help written materials only.

Zhu *et al.* (1996) randomized nearly 3030 smokers who called an advertised toll-free helpline and who indicated willingness to quit within 7 days of the contact to one of three conditions: (1) self-help materials only, (2) self-help materials plus a single telephone counseling session prior to quit date, and (3) self-help materials plus six telephone counseling sessions, one prior to quit date and five over the subsequent month. The six calls were scheduled to coincide with the points in the relapse curve self-quitters have found to be most likely to relapse. The 12-month continuous abstinence rates for those three conditions were 14.7, 19.8 and 26.7%, respectively. Thus, there was a dose-related effect for telephone counseling although it did not appear that the increase in quits for the six counseling calls was proportional to the increased number of telephone calls. These investigators have also shown that the California Smokers' Helpline reaches an ethnically and geographically representative sample of smokers (Zhu *et al.*, 1995).

Two randomized trials found significant effects in the short term, but no long-term differences. The Lando *et al.* (1992) study intervened with four separate smoker populations. Follow-ups occurred at 6 and 18 months. Overall differences were significant at 6, but not 18 months. However, although trends were in the expected direction within each of the four population groups, differences between intervention and control conditions were significant only for previous cessation class or Quit and Win contest participants (recyclers). This study also employed two calls; fewer than the four used by Orleans *et al.* (1991) and the six used in one condition by Zhu *et al.* (1996). The Orleans group extended their work to older smokers (mean age = 61) in a program which involved two 'brief' follow-up calls at 3 and 18 weeks after randomization (Rimer *et al.*, 1994). Compared to a tailored manual only, the telephone calls produced significantly more quitting at 3 months (12 versus 9%), but not at 1 year (19 versus 20%).

A non-controlled demonstration in a worksite setting was able to reach nearly all of the 55 smokers (Thompson *et al.*, 1995a). Smokers

received phone calls every 3 months tailored to their stage-of-change (DiClemente *et al.*, 1991). Thirteen percent of all worksite smokers quit for at least 6 months. The Ossip-Klein *et al.* (1994) pilot study described above found women were more responsive than men to two proactive phone calls.

Meta-analysis of efficacy of proactive phone counseling

We located 10 proactive telephone interventions in which the telephone component was experimentally evaluated in a randomized design and three in which telephone counseling appeared to be the primary component, but not the entire intervention that was evaluated (Taylor *et al.*, 1990; Ockene, 1992; DeBusk *et al.*, 1994). Table I summarizes the short- (3–8-month follow-up) and long-term (12–18-month follow-up) results of these trials. We present self-report data since these are found in all studies; nine of the studies did obtain a biochemical measure for at least one assessment point. As shown in Table I, the short-term results for eight trials are positive and usually significant. However, this effect usually disappeared by long-term follow-up. Four of 13 studies reported significant effects long-term of telephone counseling; the two studies reporting the largest effects (Taylor, 1990; DeBusk *et al.*, 1994) included other intervention components in addition to phone counseling.

In order to describe and evaluate these outcomes more precisely, a meta-analysis was performed. The 13 studies in Table I may be considered a 'best evidence' (Slavin, 1986) subset of the literature on the topic and, as such, are well suited to meta-analytic procedures. Each of the studies was cast into both a short- and a long-term (*cf.* Table I) 4-fold frequency table showing the count of smokers and quitters in treatment and control conditions, and the tables were used to create weighted adjusted log odds ratios as measures of effect size (Naylor, 1967). Separate analyses for both the short-term and long-term outcome sets were conducted using the method of combining log odds ratios given by Fleiss (1981). Briefly, this entailed first establishing a total χ^2 , weighted by sample size, for a set of

Table I. Short (3–6 months) and longer (12–18 months) term outcomes of proactive studies containing control conditions

Study	No. of phone calls	Short-term cessation		Long-term cessation	
		Phone (%)	Control (%)	Phone (%)	Control (%)
Curry <i>et al.</i> (1996)	three over 3 months	11	4	11	9
DeBusk <i>et al.</i> ^a (1994)	two in first week; then monthly (hospitalized MI patients)	69	55	70	53
Lando <i>et al.</i> (1992)	two calls over 2–3 weeks	12	8	14	16
Lando <i>et al.</i> (1994a) ^b	up to three calls at three time points after clinic treatment	35.4	30.3	34.2	32
Lando <i>et al.</i> (1994b)	four calls with TNS	26	34	21	22
Mermelstein <i>et al.</i> (1994) (personal observation)	seven calls for both conditions (recycling versus support after clinic treatment)	45	38	30.3	29.5
Ockene <i>et al.</i> (1991, 1994)	three calls at monthly intervals	13.9	11.2	reported as 'non-significant'	
Ockene <i>et al.</i> (1992)	four over 4 months after discharge from coronary arteriography	62	51	57	48
Orleans <i>et al.</i> (1991)	four calls over 1 year	19	11.5	21.5	13.7
Prochaska <i>et al.</i> (1993) ^c	four calls—stage-based over 6 months	14	16	18	21
Rimer <i>et al.</i> (1994)	two stage-based calls versus tailored guide versus control guide	12	9 7	19	20 15
Taylor <i>et al.</i> (1990) ^a	weekly for 3 weeks, then monthly for 4 months (hospitalized MI patients)	not reported		61	32
Zhu <i>et al.</i> (1996)	six calls versus 1 call versus written materials alone	47	30 23	26.7	19.8 14.7

^aPhone calls only part of difference between conditions.

^bShort-term is 3 months after phone calls terminated; long-term is 1 year after calls completed.

^cControl group received written self-help materials.

studies then partitioning this total into a χ^2 for homogeneity and for association. Testing the former allows statements as to whether the set of studies have a common estimate of the log odds ratio, while testing the latter provides evidence as to whether the common estimate differs significantly from zero. Given debate about the merits of homogeneity testing as a required precursor to a test of association (e.g. Bishop *et al.*, 1975; Mantel *et al.*, 1977; Hunter and Schmidt, 1990), we adopted the conservative approach of finding a subset of the studies with a homogeneous estimate and testing the association (significance) for that subset.

Initial tests of heterogeneity on the proactive studies using Hedges and Olkins (1985) Q -statistic revealed that both short- and long-term follow-up results were heterogeneous (see Figure 1). From both visual inspection and comparisons of each study with all other studies in the set (Fleiss, 1981, p. 185), it appeared that the Zhu *et al.* (1996) study was an outlier, especially at short-term follow-up. Exclusion of this study from the short-term follow-up resulted in a non-significant test of heterogeneity among the remaining 11 studies. The common odds ratio comparing cessation rates in the phone counseling versus control conditions in these stud-

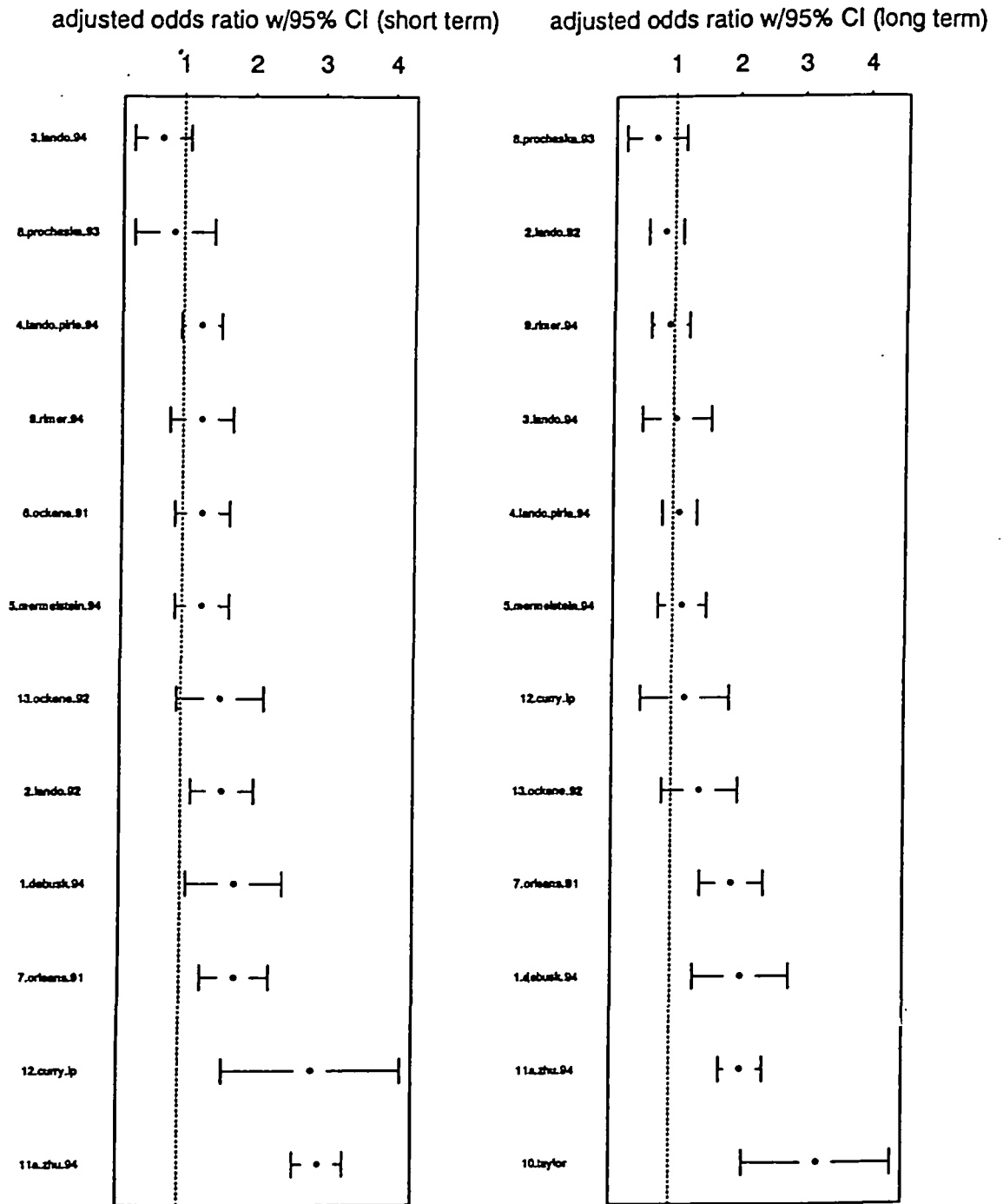


Fig. 1. Adjusted odds ratios (and 95% confidence intervals) for short- and long-term cessation outcomes of telephone counseling.

ies was 1.34 (95% confidence interval of 1.19–1.51). Thus, we conclude that after excluding the Zhu *et al.* (1996) study, these results were homogeneous and that phone counseling produced a modest significant effect. The Zhu *et al.* (1996) study had an odds ratio of 2.98 (CI = 2.63–3.32), further confirming the short-term effects of phone counseling.

At long-term follow-up, it was necessary to remove two additional studies to obtain a non-significant test of heterogeneity—the Lando *et al.* (1992) study and the Taylor *et al.* (1990) report. After excluding these three studies, the remaining nine studies were homogeneous and produced a significant common odds ratio of 1.20 (95% confidence interval 1.06–1.37). Although this is a modest effect size, it should be noted from Figure 1 that two of the three excluded studies (Taylor *et al.* and Zhu *et al.*) had large and highly significant odds ratios.

The 'fail safe N ' (Orwin, 1983) or number of studies reporting no difference between conditions (an odds ratio of 1.0) that would be necessary to make the combined odds ratio non-significant, was four for short-term follow-up and two for long-term follow-up.

Summary

Over a variety of settings, proactive counseling calls have shown consistent beneficial effects, although the long-term outcomes are less consistent than short-term effects. Although the studies vary in their definition of abstinence and reliance on biochemical confirmation, the randomized designs give credence to the comparisons within studies. In addition, the comparison conditions in several studies included active intervention components. In two of the successful studies (Orleans *et al.*, 1991; Zhu *et al.*, 1996) subjects were presumably well-motivated since they volunteered for the program. While Taylor *et al.* (1990) and DeBusk *et al.* (1994) actively attempted to recruit all eligible hospital patients, their sample was also likely well motivated because of the experience of a myocardial infarction. It is also possible that environ-

mental support (e.g. non-smoking policies) was a factor in the successful studies: from the medical providers following the MI patients (DeBusk *et al.*, 1994; Taylor *et al.*, 1990); from the California anti-smoking media campaign (Zhu *et al.*, 1996); and possibly from the HMO and its providers in the Orleans *et al.* (1991) study. These conjectures must be taken cautiously.

Discussion

The efficacy of reactive telephone counseling has been evaluated in very few trials. The results of the largest and best controlled trial (Ossip-Klein *et al.*, 1991) are positive, lending some basis for optimism. There exists a nationwide, professionally staffed helpline, the CIS. The intrinsic nature of a reactive helpline makes it difficult to evaluate. Once a community-based helpline is established, it is not feasible to deny service to callers and thereby construct a true control group. The CIS does have the capability of collaborating with media campaigns to increase usage and even target selected populations of smokers (Davis *et al.*, 1992; Cummings *et al.*, 1993).

We conclude that reactive telephone services such as CIS and 'Freedom Line' (Ossip-Klein *et al.*, 1991, 1984) have public health significance and are likely cost-effective—in the loose sense of that term—if employed with a large population base. Once these systems are in place, operating costs are modest and they are available to large numbers of potential users. 'Freedom Line' and similar programs use recorded messages to a large extent and the occasional requests for personal counseling are typically handled by regular office staff, volunteers or part-time workers. While CIS requires dedicated, trained staff, the costs are spread over a variety of cancer control issues. Although specific cost data are seldom reported, there are likely significant economies of scale.

Proactive telephone counseling lends itself more readily to randomized trials and has been more systematically studied. Although not all studies are statistically significant, meta-analysis showed an

overall intervention effect both at short-and long-term follow-up. The meta-analytic effect, even though modest in magnitude, was found even when studies with large odds ratios (Taylor *et al.*, 1990; Zhu *et al.*, 1996) were excluded to achieve homogeneity.

The aggregate odds ratios for telephone counseling at 12-month follow-up, i.e. 1.34 and 1.20, are considerably smaller than the odds ratios reported in meta-analyses of the nicotine patch, i.e. 2.07 (Silagy *et al.*, 1994) and 3.0 (Fiore *et al.*, 1994). Worksite smoking cessation programs yielded an effect size of 0.21 (Fisher *et al.*, 1990) which corresponds roughly to the values reported here.

Figure 1 indicates that telephone counseling was most effective as an adjunct to hospital-initiated programs, at least for high risk cardiac patients (Taylor *et al.*, 1990; DeBusk *et al.*, 1994; Ockene *et al.*, 1992). The pooled odds ratios for this subset of three studies were 1.45 (CI = 1.13–1.85) for short-term outcomes and 2.01 (CI = 1.47–2.74) for long-term outcomes. Calls were also a component of a successful hospital-initiated program for routine hospital admissions (Stevens *et al.*, 1993). More research on this approach seems warranted, especially given evidence of the cost-effectiveness of the program for high risk MI patients (Krumholz *et al.*, 1993). Telephone counseling also was effective as the major or sole component for motivated smokers (e.g. Orleans *et al.*, 1991; Zhu *et al.*, 1996).

It is disappointing that telephone counseling did not augment the efficacy of nicotine replacement therapy (Ockene *et al.*, 1991; Lando *et al.*, 1994). Such telephone counseling would seem like a convenient way to provide the support and counseling typically absent in primary care settings (Lichtenstein, 1992). Nicotine patch distributors have established helplines with this reasoning in mind and one patch distributor established a program that includes proactive calls and tailored written advice after the patient calls in and provides the needed information for tailoring (Committed Quitters Program: V. Strecher, personal communication). Further research on the integration of

nicotine replacement therapy and proactive and reactive phone calls would be very useful.

The number, timing and content of counseling calls merits consideration and possible research attention. The number of calls has ranged from one (Zhu *et al.*, 1996) to a possible nine (Lando *et al.*, 1994). Only one study empirically evaluated the effect of different numbers of calls. Zhu *et al.* (1996) found a dose-response-like effect in that six calls were significantly more effective than one call, which in turn was more effective than written materials only. A cost analysis of the Zhu *et al.* (1996) data would be interesting to gauge the cost-effectiveness of the five additional calls.

The timing of the calls has been driven by the interests of the investigators. Those concerned with relapse prevention have tended to bunch the calls shortly after the quit date (e.g. Zhu *et al.*, 1996) or the end of hospitalization (e.g. Taylor *et al.*, 1990); those concerned with recycling smokers to make new quit attempts have initiated calls well after subjects finished the initial program (e.g. Lando *et al.*, 1994). The Zhu *et al.* (1996) study provides an explicit rationale for timing calls based on an analysis of the relapse curve.

The content of the calls has usually focused on problem-solving related to the subjects stage of change (DiClemente *et al.*, 1991). Only two studies compared stage of change telephone counseling with non-specific support (Mermelstein *et al.*, unpublished observation) or generic problem-solving (Thompson *et al.*, 1995b) and neither found any clear differences. Any telephone counseling, of course, also provides support and encouragement. Whether trained counselors emphasizing stage related problem-solving produce results above non-specific support remains to be demonstrated (Mermelstein *et al.*, unpublished observation) and has implications for the level of training necessary for telephone counseling.

The costs of proactive phone calls deserve consideration. Major costs include counselor wages (including training time) and phone charges. It typically takes several tries to reach a participant. We gauge that this method is not cheap, but it still

may be cost-effective. It must also be recognized that most smokers cannot or will not attend cessation classes (Lichtenstein and Hollis, 1992) where counselor time could be spread over more participants and many smokers live in rural areas where telephone counseling may be one of few feasible sources of personal support. More research on the usefulness of telephone counseling for specific populations, e.g. older or rural smokers, would be informative.

In conclusion, reactive smoking cessation helplines appear to be a useful public health smoking control strategy for large populations. Technical innovations will certainly increase the flexibility, and perhaps influence the attractiveness, of reactive phone lines (Burke, 1993; Schneider *et al.*, 1995). Proactive telephone counseling has little support as an adjunct to cessation classes or nicotine replacement, but does seem effective in augmenting hospital initiated programs and can be efficacious when serving as the core of the intervention. Proactive telephone counseling is probably more expensive and may be best seen as a clinical smoking control strategy, but one that can reach smokers who would not otherwise receive services. Additional research is needed on both efficacy and the relative cost-effectiveness of proactive and reactive telephone interventions across different populations.

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