BRIEF REPORT

Behavioral Smoking Cessation Treatment for Older Chronic Smokers

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The benefits of behavioral smoking cessation treatment were examined in 82 chronic smokers 50 years of age and older. Participants were randomized into one of four intervention conditions: (1) behavioral training only, (2) behavioral training and nicotine gum, (3) behavioral training and physical exercise, and (4) physical exercise only. Behavioral training involved 3 months of group treatment, and physical exercise consisted of a 3-month walking program. Quit rates were assessed at program end and at 4, 7, and 12 months post-randomization. At 12 months the proportion quit across groups was respectively 31.8, 36.4, 27.8, and 10.0%. One-year quit data indicated that behavioral training facilitated cessation over the physical exercise only condition.

The health consequences of smoking constitute a nationwide concern for older individuals (USDHEW, 1986). It has been documented that for adults 50 years of age and older cigarette smoking is a leading risk factor for accelerated physical decline and even premature death (Special Committee on Aging, 1986). Seventeen-year mortality data from the Alameda County Study indicate that current smokers age 60 and older have 1.5 times the all-cause mortality risk over those who do not smoke cigarettes (Kaplan, Seeman, Cohen, Knudsen, & Guralnik, 1987).

Cigarette smoking has also been related to self-reported physical symptoms. Rimer, Orleans, Keintz, Cristinzio, and Fleisher (1990; see also Orleans, Rimer, Cristinzio, Keintz, & Fleisher, 1991) examined self-report data for 339 current smokers, 1,489 former smokers, and 1,316 never smokers between the ages of 50 and 102. Older smokers reported a higher frequency of smoking-related symptoms, including coughing, trouble breathing, and low stamina. Seventy

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percent of the smokers reported at least one unsuccessful attempt to quit, but only 33% believed that they could actually quit. Rimer et al. (1990) noted that "while there are an increasing number and variety of smoking cessation programs, none has been designed specifically with the older adult in mind" (p. 548).

The Surgeon General has targeted older adults for national smoking cessation initiatives (USDHHS, 1990). However, there are only a few studies that have examined cessation interventions for the older adult smoker. Vetter and Ford (1990) assessed the effectiveness of direct advice from a physician for quitting smoking on short-term cessation in 471 chronic smokers over 60 years old. The intervention consisted of face-to-face advice from a practicing physician followed by age-appropriate cessation strategy information from a nurse practitioner. At 6 months posttreatment, the authors reported a verified quit rate of 14% in the intervention condition versus 9% in the control group.

There is a need to examine more intensive cessation intervention strategies that target the older smoker. The available literature suggests that older smokers are, for the most part, chronic smokers who do not engage in health-promoting behavior. Hill and Fisher (1992) postulated that older smokers may be less likely to change their habit without the aid of a meaningful coping substitute. There are two treatment adjuncts that may be important to consider as part of behavioral cessation treatment with the older smoker: (a) nicotine replacement therapy, and (b) physical exercise. Nicotine replacement therapy has been effective as a treatment adjunct with middle-aged and younger smokers (Christen, McDonald, Olson, Drook, & Stookey, 1984; Killen, Fortmann, Newman, & Varady, 1990). Its role in conjunction with behavioral treatment has been to prevent relapse following cessation by reducing physical dependence on nicotine.

It has also been proposed that physical exercise may provide a replacement activity for the chronic smoker that is incompatible with the urge to smoke. In addition, engaging in physical exercise may help recent quitters adopt lifestyle habits that will sustain nonsmoking (Brownell, Marlatt, Lichtenstein, & Wilson, 1986). Several studies have found that when exercise is part of behavioral treatment in younger smokers, the likelihood of successful short-term cessation is enhanced (Marcus, Albrecht, Niaura, Thompson, & Abrams, 1991; Hill, 1985). When prescribed independent of behavioral treatment, physical exercise appears to have no effect on cessation (Russell, Epstein, Johnston, Block, & Blair, 1988; Taylor, Houston-Miller, Haskell, & Debusk, 1988).

The purpose of the current investigation is to examine the relative efficacy of a behaviorally oriented smoking cessation intervention for the older smoker. This study also explored the added benefits of incorporating either nicotine-replacement therapy or a walking-based exercise program as part of behavioral treatment.

Method

Subjects

Current smokers 50 years of age or older who had smoked for at least 30 years were solicited through radio and newspaper advertisements to partici-
pate in a stop-smoking program. A total of 130 volunteers were screened for physical and/or psychological impairment that would preclude involvement in a walking program or the use of nicotine gum. Participants were selected only if they indicated that they did not currently engage in regular walking as a form of physical exercise. Prior to treatment, volunteers attended a group orientation meeting in which they completed a demographic survey, self-report questionnaires, and physiological measures including expired carbon monoxide and a standardized 1-mile walk (Rippe, Ward, Porcari, & Feedson, 1988). Group assignment followed this meeting.

Of the 130 volunteers, 36 did not pass the screening criteria. Eight others who completed screening failed to attend the initial or any treatment session, and 4 dropped out during the course of treatment. Data were analyzed with and without the 4 treatment dropouts categorized as treatment failures. The results were the same; therefore, analyses are based on the 82 participants who completed the program. Participants had a mean age of 59.4 years ($SD = 7.2$) and had smoked for an average of 39.8 years ($SD = 8.9$); 47.6% were male. They reported smoking an average of 27.8 cigarettes per day ($SD = 13.6$) with a mean baseline carbon monoxide level of 35.3 ppm ($SD = 12.8$). The mean baseline nicotine tolerance score (Fagerstrom, 1978) was 6.5 ($SD = 1.6$; Range: 2 to 11), indicating that this sample of older smokers was dependent on nicotine. The mean baseline self-efficacy score (Conditete & Lichtenstein, 1981; McIntyre, Lichtenstein, & Mermelstein, 1983) was 71.4 ($SD = 28.4$). Participants rated their general health status on a 7-point scale (1 = excellent to 7 = poor) with a mean health rating of 3.5 ($SD = 1.7$). Random assignment was made, in blocks of approximately 8 to 12 individuals, to one of the following 3-month treatment conditions: behavioral treatment only ($n = 22$), behavioral treatment combined with nicotine gum ($n = 22$), behavioral treatment combined with physical exercise ($n = 18$), or physical exercise only ($n = 20$).

**Training Groups**

A total pool of six instructors with experience in smoking cessation and/or exercise training were used as program leaders. Each treatment group was assigned two leaders who carried out the treatment protocol as well as the designated follow-ups for their respective group. Training and supervision were provided to maintain comparable leader effects across the four conditions. In those groups that received exercise training, one leader was responsible for the walking program, and the second leader was responsible for the smoking cessation protocol (groups 1-3) or insuring that participants received encouragement to quit smoking (group 4).

**Group 1: Behavioral training only.** Behavioral training materials were adapted from the smoking cessation program used by the Lung Health Study, an NIH-sponsored clinical trial that involved nearly 6,000 adult smokers (O'Hara et al., in press). Components of behavioral training were as follows: (1) tailored information highlighting the health consequences of smoking in advanced age, (2) specific documentation that older smokers can quit and improve their quality of life, (3) environmental planning that involved removing smoking-related cues (e.g., matches, ashtrays), (4) setting a quit date that involved a contract
with fellow group members, (5) relapse prevention training that included identifying high-risk situations, role-playing coping responses to those situations, and problem-solving individual slips between treatment sessions. This program is in manual form and is available from the first author.

Participants met for a total of twelve 90-minute sessions across the 3-month treatment program. During the first month participants met eight times (once during week 1, four times during quit week, twice during week 3, and once during week 4). In months 2 and 3 participants met once every two weeks. Between sessions, group leaders contacted individuals by phone to check on their progress and to provide assistance as needed. The total number of group sessions plus phone contacts was equal to the number of formal exercise sessions for the exercise groups. The stated goal of behavioral training was smoking cessation on quit day and maintenance of nonsmoking for the remainder of the treatment program and through each follow-up.

**Group 2: Behavioral training and nicotine gum.** Participants received identical behavioral training to those in group 1. In addition, during the first treatment meeting a project physician evaluated each participant and prescribed nicotine gum. Nicotine gum was provided at no cost to each subject during the 3-month treatment program and was available to participants as needed up to the 4-month follow-up interval. Participants were required to attend group meetings and/or participate in scheduled follow-ups to renew their supply of nicotine gum. Participants were encouraged to use nicotine gum and were given detailed instruction about its use in conjunction with behavioral training as a way to resist the urge to smoke. Although individuals regulated their own gum use (e.g., the number of pieces chewed per day), group leaders encouraged participants to use the gum daily as a way to deal with physical urges to smoke.

**Group 3: Behavioral training and exercise.** Participants received behavioral training as described for group 1. The behavioral training schedule was modified to incorporate a regular program of physical exercise. Physical exercise consisted of graduated walking following a standard protocol administered by the exercise leader through the Department of Exercise and Sports Science, College of Health. Specifically, individuals met and walked as a group over a 3-month time period. Both indoor and outdoor walking facilities were available to facilitate regular walking irrespective of weather conditions. The first 60 minutes of each session were devoted to behavioral training, followed by exercise (45 minutes). Because behavioral training required fewer formal group meetings than the exercise program, a percentage of the treatment sessions for group 3 involved only exercise.

The exercise component involved three formal group meetings each week during the first month. This was decreased to twice a week during month 2, and once a week during month 3. During months 2 and 3, participants were encouraged to walk at least three times per week. This involved walking with the group at the designated times, as well as walking on their own between group meetings. When a group member failed to attend a formal walking session, a leader contacted that individual by phone to encourage continued walking outside of group meetings and/or to problem-solve group attendance issues when necessary.
At each formal group walking session, subjects spent 10 minutes warming up, followed by a period of steady walking which varied from 15 to 35 minutes depending on the individual's baseline level of fitness as determined from an estimated training heart rate from the 1-mile standardized walk at the group orientation meeting. The goal of the walking program was to increase training heart rate to 60–70% of heart-rate reserve and to maintain this target rate for longer periods of time as conditioning improved. Participants were trained to monitor their own heart rate as they walked in order to sustain their target heart rate. At each exercise session, group leaders followed up on the smoking cessation goals that were made during the previous behavioral training session.

**Group 4: Exercise only.** Group 4 was a placebo control. Previous studies have indicted that exercise alone does not produce cessation benefits over a wait-list control (Russell et al., 1988; Taylor et al., 1988). The exercise protocol was a method of controlling for contact time, given that participants in this condition met as a group with an exercise leader on the same schedule as described for group 3. At the initial session, participants received 1 to 3 minutes of general encouragement to quit and were given a self-help stop-smoking pamphlet published by the American Cancer Society. The stated purpose of this intervention was to promote smoking cessation through improved fitness. The group leaders were not aware that this was a placebo control condition. At each meeting leaders recorded self-reported smoking status, conducted the prescribed exercise-training protocol, and encouraged group members to quit.

**Results**

One-way ANOVAs revealed no differences between groups \( (p > .20) \) across baseline measures including age, number of cigarettes smoked per day, number of years smoked, expired carbon monoxide levels, self-reported self-efficacy to resist the urge to smoke, nicotine tolerance, and global health ratings. An analysis of proportions was not significant for gender across groups, \( \chi^2 (3) = 6.82, p > .07 \), although less than half of the subjects in groups 3 and 4 were male.

Attendance at each of the treatment sessions was assessed. All participants attended at least three treatment sessions. In the groups that received behavioral treatment, every participant attended the specific meeting designated “quit day,” irrespective of smoking status at that time. Because the number of sessions varied depending on the specific treatment program, number of sessions attended was converted to a proportion of the respective total; perfect attendance across all subjects would yield a mean proportion of one. The proportion of meetings attended in each of the groups was as follows: Group 1, \( M = .65 (SD = .31) \); Group 2, \( M = .66 (SD = .26) \); Group 3, \( M = .57 (SD = .20) \); Group 4, \( M = .53 (SD = .22) \). A one-way ANOVA of proportion of meetings attended revealed no differences in meetings attended between groups, \( F(3, 78) = 1.33, p > .20 \).

Table 1 summarizes the percent quit at each of the respective follow-up intervals. Abstinence required a self-report of nonsmoking for at least the previous five consecutive days, with verified CO less than 10 ppm. In a few instances subjects refused or were unable (e.g., moved outside the state) to
TABLE 1
PERCENTAGE (AND NUMBER) OF SUBJECTS ACHIEVING ABSTINENCE AT DESIGNATED POSTTREATMENT PERIODS

<table>
<thead>
<tr>
<th>Treatment groups</th>
<th>3 Months a</th>
<th>4 Months</th>
<th>7 Months</th>
<th>12 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1: Behavioral only</td>
<td>45.5 (10/22)</td>
<td>31.8 (7/22)</td>
<td>27.3 (6/22)</td>
<td>31.8 (7/22)</td>
</tr>
<tr>
<td>Group 2: Behavioral and nicotine gum</td>
<td>45.5 (10/22)</td>
<td>40.9 (9/22)</td>
<td>50.0 (11/22)</td>
<td>36.8 (8/22)</td>
</tr>
<tr>
<td>Group 3: Behavioral and exercise</td>
<td>33.3 (6/18)</td>
<td>33.3 (6/18)</td>
<td>22.2 (4/18)</td>
<td>27.8 (5/18)</td>
</tr>
<tr>
<td>Group 4: Exercise only</td>
<td>25.0 (5/20)</td>
<td>10.0 (2/20)</td>
<td>20.0 (4/20)</td>
<td>10.0 (2/20)</td>
</tr>
</tbody>
</table>

a End of treatment.

have their CO taken. In those instances nonsmoking was verified by an informant determined prior to program participation. Two participants died during the course of the follow-up. Both participants self-reported smoking in the follow-up interval preceding their death; thus, these individuals were counted as continuing smokers through the 12-month follow-up.

An analysis of proportion quit at each treatment interval revealed no differences between the four groups at treatment end, \( \chi^2(3) = 2.64, p > .40 \), or at any of the subsequent follow-up periods (\( p > .10 \)). At the 12-month follow-up there were approximately three times as many quitters in the three behavioral groups versus the physical exercise only condition. When quit data from these three groups were combined and compared to the exercise only group, a significant difference was found in proportion quit, \( \chi^2(1) = 3.84, p < .05 \), favoring the behavioral groups. No differences between the three groups receiving behavioral treatment were found at 12 months.

An exploratory analysis was conducted within group 2, contrasting consistent gum users and intermittent users. The average use of nicotine gum during the 3-month treatment program was 6.8 pieces per day (SD = 3.1; Range 0 to 14). Six of the 22 participants discontinued gum use within the first two months of treatment. Three of these individuals reported that they were not using the gum due to denture problems and/or gastric irritation. Of these intermittent users, 17% were abstinent at 12 months versus a 44% abstinence rate among the regular gum users, although this difference was not significant, \( \chi^2(1) = 1.38, p > .20 \). A second exploratory probe compared 8 individuals in group 3 who walked regularly (attended 60% or more of the exercise sessions and reported walking outside of scheduled sessions) to 10 individuals who reported intermittent walking. Of the intermittent walkers, 10% were abstinent at 12 months versus a 50% abstinence rate for the regular walkers; and this difference approached significance, \( \chi^2(1) = 3.55, p = .060 \).

At the 12-month follow-up across all groups, 22 subjects were abstinent. This was in contrast to 60 participants who continued to smoke. Mean scores across selected baseline measures for these two groups are reported in Table 2.
TABLE 2
MEANS AND STANDARD DEVIATIONS OF BASELINE MEASURES FOR SMOKERS versus QUITTERS AT THE 12-MONTH FOLLOW-UP

<table>
<thead>
<tr>
<th></th>
<th>Smokers (n = 60)</th>
<th>Quitters (n = 22)</th>
<th>p &lt; .05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>59.9</td>
<td>57.8</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>7.2</td>
<td>7.4</td>
<td></td>
</tr>
<tr>
<td>Percent male</td>
<td>54.6</td>
<td>45.0</td>
<td></td>
</tr>
<tr>
<td>Years smoked</td>
<td>40.5</td>
<td>38.0</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>8.9</td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td>Carbon monoxide</td>
<td>33.6</td>
<td>40.0</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>12.1</td>
<td>13.9</td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>67.8</td>
<td>81.3</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>26.7</td>
<td>31.3</td>
<td></td>
</tr>
<tr>
<td>Fagerstrom</td>
<td>6.6</td>
<td>6.2</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>1.6</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Health ratinga</td>
<td>3.6</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>1.7</td>
<td>1.6</td>
<td></td>
</tr>
</tbody>
</table>

a Health ratings were based on a 7-point scale (1 = excellent to 7 = poor).

A MANOVA incorporating age, number of years smoked, expired carbon monoxide, self-efficacy, nicotine tolerance, and perceived health yielded a significant between groups effect, $F(6, 75) = 2.20, p < .05$. Subsequent univariate ANOVAs revealed that his difference was due to higher self-efficacy scores and expired CO at baseline among the group who were nonsmokers.

Discussion

The purpose of this investigation was: (1) to evaluate the effectiveness of a behaviorally based smoking cessation program for older smokers, and (2) to explore the potential benefits of incorporating exercise or nicotine gum as part of behavioral treatment. The smokers in this study were at least 50 years of age with a relatively long history of cigarette usage and reported themselves as highly addicted. Cessation data at 12 months indicated that behavioral training facilitated higher abstinence rates than placebo training. The percent abstinent at 12 months in the exercise only condition was consistent with the abstinence rate for the control group in the Vetter and Ford (1990) study.

The study lacked sufficient statistical power to adequately assess the added benefits of physical exercise or nicotine gum. This highlights several important issues to consider in future research with older smokers. First, it is essential to estimate an appropriate sample size in relation to the primary outcome measure (proportion quit). The small sample in this study made it difficult to insure that the groups were uniform with respect to secondary variables such as gender. It also amplified the impact of noncompliant individuals. In
the behavior/exercise condition, for example, only 8 participants reported following the prescribed exercise regimen. Given this number of compliant subjects, relative to those who were noncompliant, it was impossible to determine whether exercise was responsible for smoking cessation or was simply an indicator of another, more important, secondary variable (e.g., participant motivation).

The exploratory analyses, however, may provide information to assist in the design of future behavioral interventions for older smokers. In relation to nicotine gum which has been documented as an effective treatment aid for addicted smokers, one fourth of the participants in the behavior/nicotine gum group chose to discontinue gum use before the end of treatment. It may be advisable to examine alternative delivery mechanisms, such as the nicotine patch (Muller, Abelin, Ehrsam, Imhof, Howald, & Mauli, 1990; Rose, Levin, & Behm, 1990), as a way to deal with potential compliance issues that may arise among older smokers.

Finally, this study suggests that age, per se, is not a significant barrier to smoking cessation. Among the 22 individuals who quit smoking, age ranged from 51 to 79. Further, it did not appear that the number of years that an individual reported smoking cigarettes or relative level of perceived addiction were distinguishing characteristics of successful quitters in this sample. As has been documented in previous research with younger populations, perceived ability to resist the urge to smoke, as measured by the self-efficacy questionnaire (Condiotte & Lichtenstein, 1981), was higher among successful quitters. The degree to which self-efficacy measures can be used with older smokers deserves continued refinement.

References


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