

Short communication

## Randomized controlled trial of physical activity counseling as an aid to smoking cessation: 12 month follow-up

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### Abstract

There is some evidence to suggest that regular supervised physical activity may be useful as an aid to smoking cessation. It is unclear whether less extensive interventions confer similar benefits. This study examined whether physical activity counseling alone increases long-term smoking abstinence and physical activity levels and reduces weight gain. 299 male and female smokers were randomized to a 7-week smoking cessation program, including nicotine replacement therapy, plus either (i) physical activity counseling ('exercise',  $N=154$ ), or (ii) health education advice ('control',  $N=145$ ). There was no significant difference in rates of continuous smoking abstinence between the exercise group and the controls at 12 months following the quit day (9.1% versus 12.4%). Significant increases in physical activity levels observed for the exercise group versus the controls at six weeks were not maintained at 12 months. There was a non-significant tendency for less weight gain in the exercise group versus the controls at 12 months ( $P=0.06$ ). Further trials are needed to examine the effect of more extensive physical activity interventions on smoking cessation, physical activity levels and post-cessation weight gain.

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Physical activity has been shown to be effective for reducing tobacco withdrawal symptoms and cravings and for reducing post-cessation weight-gain (Ussher, 2005). While other evidence suggests that physical activity may be useful as an aid to smoking cessation (Ussher, 2005). Previous studies showing a

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benefit for physical activity as an aid to smoking cessation have involved thrice weekly supervised exercise and such a demanding regime will be impractical for many individuals and for smoking cessation services. The present study adopted a less intensive approach, promoting physical activity through counseling alone. A trial was conducted to examine whether adding brief physical activity counseling to a smoking cessation program increases rates of smoking cessation and physical activity levels, and reduces post-cessation weight gain. A detailed description of the methods, and the findings at six weeks of abstinence, are reported elsewhere (Ussher, West, McEwen, Taylor, & Steptoe, 2003). The present paper reports the findings following 12 months of abstinence.

## **1. Methods**

Men and women aged 18 to 65 years, smoking at least 10 cigarettes a day for at least 3 years, who were motivated to stop smoking, were not contraindicated for physical activity and had not engaged in 30 min of moderate intensity physical activity on five days a week, or 20 min of vigorous activity on three days a week during the past 3 months, were recruited through newspaper advertisements or referral from their physician. The study was insufficiently powered to have a realistic chance of detecting significant differences in smoking abstinence at 12 months follow-up (see Ussher et al., 2003). The Cochrane systematic review of exercise interventions for smoking cessation (Ussher, 2005) encourages authors to present long-term outcomes for smoking cessation even where the study is underpowered to detect significant differences. Such information may be useful when designing future studies; for example, in producing power calculations. Therefore, in an exploratory manner we examined tendencies for group differences in smoking abstinence and we tested for significant group differences in physical activity levels and weight gain at 12 months. Participants were randomized to either: (i) a smoking cessation program involving behavioural support and nicotine replacement therapy (NRT) plus brief physical activity counseling ('exercise'), or (ii) the same cessation program plus health education ('control'). Participants gave written consent and the local ethics committee gave its approval.

On an individual basis, all participants attended six weekly treatment sessions and follow-ups two weeks after the final treatment (six weeks after quitting) and 12 months after quitting. There was no contact with participants between the follow-ups at six weeks and 12 months after the quit day. The treatment incorporated self-monitoring, goal-setting, preparing for high risk situations, and coping with tobacco withdrawal. Participants were required to stop smoking immediately prior to their second session. All participants were advised to use 15 mg 16 h nicotine patches following their final cigarette, throughout the treatment program.

At each treatment session the exercise group received approximately 5 min of cognitive-behavioural physical activity counseling; incorporating decision balance sheets, goal-setting, relapse prevention planning and self-monitoring. These participants were advised to progress towards 30 min of physical activity, of at least a moderate intensity, on at least five days a week (Department of Health, 2004). The final visit included a 10 min physical activity counseling session focusing on relapse prevention planning. The controls received health education advice; relating to healthy eating, fat and salt intake, alcohol consumption and stress management, for a comparable time as for the physical activity counseling.

At the first visit demographic and smoking information was collected (see Ussher et al., 2003); including the Fagerström Test of Nicotine Dependence (FTND, Heatherton, Kozlowski, Frecker, & Fagerström, 1991), the four-item Perceived Stress Scale (PSS4, Cohen, Kamarck, & Mermelstein, 1983)

and a rating of confidence for quitting smoking (West & Willis, 1998). During the treatment program measures were taken of urges to smoke and tobacco withdrawal symptoms (West & Hajek, 2004; West, Hajek, & Belcher, 1989). Physical activity was self-reported during a structured interview in which participants recalled episodes of at least moderate intensity activity for each day during the previous week (Blair et al., 1985). Weight, without shoes in light clothing, was measured on calibrated scales to the nearest 0.1 kg. Continuous and lapse free abstinence from smoking from the quit day was assessed each week during the treatment program and six weeks and 12 months following the quit day by self-report verified with expired air carbon monoxide concentration (<10 ppm). Those who were not abstinent during the treatment program were excluded from the study and referred to local smoking treatment services. Only those reporting 12 months of continuous abstinence via telephone were invited to attend a face-to-face assessment at 12 months. Assessments at this time included self-reported smoking abstinence (verified by expired CO < 10 ppm), self-reported physical activity levels and weight.

Analyses were conducted on an intention-to-treat basis according to random assignment at baseline, with two-tailed tests, and using SPSS version 13. The baseline characteristics of the two groups were compared using analysis of variance (ANOVA) and chi-squared ( $\chi^2$ ) tests.  $\chi^2$  tests were also used to analyze differences in smoking abstinence by treatment condition. Differences in reports of physical activity levels and in weight were assessed by treatment condition using Mann–Whitney tests. Regression analysis was used to examine predictors of smoking cessation at 12 months.

## 2. Results

At baseline 299 smokers were randomized; 154 to the exercise condition and 145 to the control condition. Six weeks from the quit date there was no significant difference (by  $\chi^2$ ) in rates of continuous abstinence for the exercise group (39.6%, 61/154) versus the control group (38.6%, 56/145). Of those abstinent at six weeks, 76.9% (90/117) were successfully contacted 12 months after their quit day. Using an intent-to-treat analysis, those not contacted were treated as having relapsed. A  $\chi^2$  test showed that significantly more of those in the control group were contactable compared with those in the exercise group ( $\chi=4.7$ ,  $P=0.047$ ). The latter finding is probably by chance.

All those who reported continuous abstinence at 12 months, via telephone, attended a face-to-face assessment and in all cases abstinence was confirmed with a CO reading of <10 ppm (mean (SD) expired CO=2.5 (1.5) ppm). At 12 month follow-up there was no significant difference in continuous abstinence rates for the exercise group (9.1%, 14/154) versus the controls (12.4%, 18/145) ( $\chi=0.9$ ,  $P=0.5$ ). Among those abstinent for 12 months, there were no significant differences for baseline measures by treatment group. Using logistic regression, smoking abstinence at 12 months was significantly associated with baseline measures for: older age, greater confidence in ability to quit, lower perceived stress score (PSS4) and being employed. Abstinence was not significantly related to other demographic and smoking characteristics (FTND score, time to first cigarette in the morning, number of previous quit attempts, cigarettes smoked per day, expired CO, weight, gender, occupation, ethnicity, marital status, hours of at least moderate intensity physical activity, partner smoking status). Using a forced entry multiple logistic regression analysis abstinence at 12 months remained significantly associated only with reports of greater confidence in ability to quit (OR=1.666,  $P=0.03$ ) and lower PSS4 (OR=0.864,  $P=0.04$ ). Logistic regression analyses also showed that abstinence at 12 months was significantly associated with lower levels of depression during the first week of abstinence (OR=0.645,  $P=0.049$ ), but was not significantly

related to other withdrawal symptoms at this time; nor was it significantly related to changes in mood and physical symptoms between pre-abstinence and one week of abstinence, or with ratings of urge to smoke during the first week of abstinence.

At the 12-month follow-up, 87.5% (28/32) of participants confirmed that their physical activity levels in the previous week were typical of the previous three months. Among those abstinent at 12 months, the exercise group reported a mean (SD) of 1.8 (2.3) h and the controls 3.1 (3.4) h of at least moderate intensity activity per week ( $P=ns$  by Mann–Whitney test). Among those reporting any activity, walking was the main mode of activity for the majority (59.1%, 13/22) of participants.

Among the 32 participants remaining abstinent from smoking for 12 months, relative to one week pre-abstinence, the mean (SD) weight gain for the exercise group was 3.9 (5.3) kg and for the control group it was 7.2 (4.1) kg. Depression during the first week was not significantly related to weight gain between pre-abstinence and 12 months. Neither was there evidence for physical activity levels at 12 months being related to this weight gain. However, there was a tendency (non-significant) for less weight gain in the exercise group, compared with the controls (Mann–Whitney  $Z=1.8$ ,  $P=0.06$ ).

### 3. Discussion

Adding brief physical activity counseling to a smoking cessation program did not increase rates of smoking abstinence at 12 months. Consistent with previous reports (Ockene et al., 2000; Swan, Ward, & Jack, 1996) smoking abstinence was predicted by greater confidence in quitting before the quit date and by lower depression in the early phase of abstinence. Further work is needed to develop interventions for treating post-cessation depression and for boosting confidence in quitting (see Hughes, Stead, & Lancaster, 2004; Stotts, DeLaune, Schmitz, & Grabowski, 2004).

The significantly higher physical activity levels observed for the exercise group compared with the controls at the end of the intervention were not maintained at 12 months. This finding is inconsistent with previous evidence showing that brief exercise counseling can raise long-term activity levels among sedentary adults (Steptoe, Kerry, Rink, & Hilton, 2001). It is possible that former smokers may require more extensive interventions than the general sedentary population. For example, previous studies showing a benefit of physical activity interventions for smoking cessation (Ussher, 2005) have incorporated regular sessions of supervised exercise and more comprehensive professional support.

Despite physical activity levels not being maintained in the exercise group at 12 months, there was a tendency (approaching significance) for those receiving the exercise counseling to have less weight gain at 12 months, compared with the control group. This may be worth investigating in future studies with larger samples. The present study was limited in that exercise data came exclusively from self-reports rather than from objective measures of activity, such as accelerometers. In addition, this study did not compare physical activity levels for those who were abstinent from smoking versus those who relapsed. In conclusion, further studies are needed with physical activity interventions involving a compromise between the demanding requirements of previous studies (see Ussher, 2005) and the brief intervention in the present study.

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