

**Acute effects of a short bout of moderate versus light intensity exercise versus inactivity on tobacco withdrawal symptoms in sedentary smokers**

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## **Abstract**

*Rationale:* A previous study found that a 10-minute bout of moderate intensity exercise reduced cigarette withdrawal symptoms in sedentary smokers but the effect may have been due to participants focusing attention on physical activity rather than the activity itself. *Objectives:* This study examined the effect of five minutes of moderate intensity exercise and five minutes of light intensity exercise on tobacco withdrawal symptoms amongst sedentary smokers. *Methods:* Eighty-four smokers attended a laboratory session having abstained from smoking for between 11 and 14 hours. Participants were randomly allocated to one of three conditions: (i) light intensity exercise (n = 28; 10%-20% of heart rate reserve(HRR)); (ii) moderate intensity exercise (n = 28; 40%-60% HRR), (iii) a passive control condition (n = 28). Both exercise conditions involved five minutes of stationary cycling and participants rated tobacco withdrawal symptoms and cravings immediately before exercise (baseline), during exercise at 2.5 minutes, immediately following exercise, then after 5 and 10 minutes of rest. Control participants made the same ratings across an equivalent time period. *Results:* There was no significant change in tobacco withdrawal symptoms over time in the control participants. Following five minutes of moderate intensity exercise, there were significant reductions in ratings of desire for a cigarette, irritability, tension, restlessness, difficulty concentrating and stress, which returned to baseline within 10 minutes of the termination of exercise. Reductions were observed in the light exercise condition for strength of desire for a cigarette, tension and restlessness during exercise and immediately after exercise but these returned to baseline following five minutes of rest. *Conclusions:* Five minutes of moderate intensity exercise is associated with a short-term reduction in nicotine withdrawal and desire to smoke. Very brief bouts of exercise may therefore be useful as an aid to smoking cessation.

**Keywords** SMOKING CESSATION, INTENSITY, EXERCISE, WITHDRAWAL.

## **Introduction**

Tobacco smoking is one of the major causes of mortality and morbidity in industrialised nations, and stopping smoking increases life expectancy (Doll et al. 1994). In the UK it has been estimated that around 70% of smokers wish to stop smoking (Department of Health, 2000), and the majority of attempts are made without professional support (West et al. 1999). Only 2-4% of these individuals however, are likely to be abstinent from smoking at 12 months (Hughes et al. 1992). Even with the most effective smoking cessation treatments, combining nicotine replacement therapy (NRT) with behavioural support, these abstinence rates are likely to increase by approximately 15% (Silagy et al. 2001). More effective aids to smoking cessation are needed.

There has been recent interest in the influence of short bouts of exercise on smoking, and there is some evidence to suggest that exercise<sup>1</sup> may have a role to play as an aid to smoking cessation (see Ussher et al. 2000 for a review). In one of the first experimental studies in this area, Pomerleau et al. (1987) examined the effects of aerobic exercise on smoking behaviour in a sample of 10 sedentary smokers. Following a period of 30 minutes smoking abstinence, individuals completed 30 minutes of low or moderate intensity exercise on two separate days. Pomerleau and colleagues reported a, non-significant trend towards a decreased desire for cigarettes 20 minutes after individuals completed a session of moderate intensity exercise. More recently, Bock et al. (1999) reported the results of two studies which examined the acute and chronic effects of vigorous exercise on nicotine withdrawal symptoms in a group of sedentary women, during a 12 week cognitive behavioural smoking cessation programme. In addition to receiving smoking cessation support, individuals were assigned to either an exercise program or to a contact control session three times per week. Immediate reductions in nicotine withdrawal and cigarette cravings were observed following 30-40 minutes of high intensity exercise relative to the controls.

Although the physical and psychological benefits of participating in regular physical activity are well established, few people achieve the recommended 30 minutes of moderate intensity most days of the

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<sup>1</sup> Term exercise is used here to encompass both structured and lifestyle exercise, such as walking

week, and approximately 25% of the adult population are classified as 'sedentary'. Compliance with any exercise program is low, and people tend to dropout within a few weeks of starting exercise. Moreover physical activity levels have been shown to be inversely associated with smoking status (Ford 2000; Kimm 2002), and asking sedentary smokers to exercise at a high intensity may be unrealistic. In the Pomerleau et al. (1987) study individuals were requested to attempt to maintain exercise intensity up to 80% of their maximum aerobic capacity for thirty minutes, yet the average intensity level sustained was only 56%.

In order to make exercise appealing to smokers, it may be beneficial to set lower, more realistic intensity targets, and for shorter durations. Recently, Ussher and colleagues (2001) examined the effects of a 10-minute bout of moderate intensity exercise on smoking withdrawal symptoms and desire to smoke in a sample of sedentary smokers. Following 15 hours of abstinence, cigarette cravings and withdrawal were assessed prior to exercise, during exercise and 5, 10 and 15 minutes after exercise. Relative to passive control group, cigarette cravings and withdrawal symptoms were significantly reduced in the exercisers. The present study sought to determine whether a shorter bout of just 5-minutes exercise would also reduce withdrawal symptoms and whether the effect could be attributed to the activity per se or the fact that participants focused attention on the activity of exercising. In the Ussher et al. (2001) study, the exercisers were required to monitor their heart rate and this may have provided further distraction. Thus the possibility remains that reductions in cravings and withdrawal were due to the distraction of taking part in the exercise, rather than the exercise per se.

The present study included a light intensity exercise condition. It was hypothesised that five minutes of moderate intensity exercise, relative to a light exercise and control condition, would produce significant reductions in smoking withdrawal symptoms and desire to smoke in sedentary smokers.

## **Materials and method**

### **Participants**

Participants had to be between 18 and 65 years of age, not receiving any form of psychiatric treatment or medical intervention, not pregnant, smoking at least 10 or more cigarettes a day for at least two years and leading a sedentary lifestyle. Following Ussher et al. (2001), individuals were considered to lead a sedentary life if they did not engage in vigorous exercise three or more times a week for at least 20 minutes, or moderate intensity activity, for at least five times a week for 30 minutes (Franklin 2000). In total 118 people expressed an interest in taking part in the study. On receiving further information 18 declined or were excluded for medical reasons. Of those agreeing to participate, 16 individuals failed to keep their appointment, and 84 people completed the testing procedure. Forty-one participants were male and 43 were female, their age ranged from 19 – 65 years.

## Design

Individuals were randomly allocated into one of three conditions: A 5-minute moderate intensity exercise condition (n = 28); a 5-minute light intensity exercise condition (n = 28); and a passive control condition (n = 28). The moderate intensity condition involved exercising for 5 minutes at 40 - 60% of heart-rate reserve (HRR), and the light intensity condition involved exercising for five minutes at 10 - 20% HRR (Karvonen et al. 1957; Franklin 2000). The intensity level was based on a resting pulse following overnight smoking abstinence. Heart rate was monitored using a Polar<sup>®</sup> Advantage heart rate monitor and readings were transmitted to a wrist receiver, thus providing instantaneously feedback to the exercisers. This study was approved by the University of Surrey Ethics Committee.

## Measures

Nicotine dependence was assessed by self-report using the Fagerström Test for Nicotine Dependence (FTND, Heatherton et al. 1991). Current levels of physical activity were assessed by self-report using the Seven Day Physical Activity Recall Questionnaire (7DPARQ, Blair et al. 1985). This questionnaire elicits

information about the type, duration and intensity of physical activity over the previous seven days and has been used extensively in sport, exercise and health research (Morgan 1997). Subjective feelings of exercise tolerance was assessed using the Borg Rating of Perceived Exertion (RPE) Scale (Noble et al. 1983; Borg 1998). The scale ranges from 6 (no exertion), to 20 (maximum exertion). The Borg scale has been found to be a reliable and valid test of perceived exertion (Whaley et al. 1997). Motivation has consistently been shown to be the single greatest predictor of cessation success (West 1984; 1987) and therefore two, brief, motivation questions were included: 'Do you want to stop smoking for good' (no, yes quite, yes very much), and 'Do you intend to make a serious attempt to stop smoking in the next 3 months' (no, maybe, yes). Tobacco withdrawal was assessed using the following items: (1) 'I have a desire for a cigarette right now' (Tiffany and Drobes 1991), rated on a 7 point scale, ranging from 1 = strongly disagree, 4 = neutral, to 7 = strongly agree, (2) irritability, (3) depression, (4) tension, (5) restlessness, (6) difficulty concentrating, and (7) stress (Mood and Physical Symptoms Scale, MPSS, West and Russell 1985). Also included was an item measuring (8) Strength of desire to smoke (West et al. 1989). These items were rated along a 7 point scale, ranging from 1 = not at all, 4 = somewhat, to 7 = extremely.

## Procedure

On initial contact individuals read and signed a written consent form and provided demographic details. They then completed the FTND (Heatherton et al. 1991) and 7PARQ (Blair et al. 1985) and two brief questions about their desire and intention to stop smoking. Individuals were asked to refrain from smoking from 11pm that night and to attend the smoking laboratory the following day.

On entering the laboratory, overnight abstinence from smoking was verified via expired carbon monoxide (CO) concentration using a Bedfont Smokerlyzer (Bedfont Scientific Instruments Ltd, UK). A reading of 10 parts per million (ppm) or less was used to confirm overnight abstinence. Participants were then randomly allocated to one of three conditions: moderate exercise condition, light exercise control condition or a passive control condition.

In the exercise conditions, participants were seated on a Weider exercise ergometer, and once comfortable they rated the 8 withdrawal and desire to smoke items orally while viewing the scales on printed cards. The participant then began a warm up period consisting of a gradual build up until their heart rate was in their target zone (following the recommendations from the American College of Sports Medicine, ACSM, 2000). At 2.5 and 5 minutes further assessments of withdrawal symptoms and cravings were taken, and ratings of perceived exertion were obtained at 1 and 4 minutes. Exercise was terminated at 5 minutes and warming down lasted approximately 2.5 minutes. Individuals dismounted from the exercise bike and sat in a chair. For all conditions interaction between the participant and experimenter was kept to a minimum. The 8 withdrawal and craving items were re-administered at 10 and 15 minutes. Participants were then informed the test session was over, and thanked for taking part and debriefed.

Individuals in the passive control condition completed the same questionnaires as the two exercise conditions (with the exception of the Borg RPE scale), but sat quietly for 15 minutes. Thus, irrespective of condition, the withdrawal and desire to smoke items were completed at baseline, and at 2.5, 5, 10, and 15 minutes.

### **Data analyses**

Data are presented as means unless otherwise stated. In order to assess differences in change from baseline to each time point across groups, a series of Group (light exercise, moderate exercise, and control) X Time (baseline, 2.5, 5, 10, 15 minutes) repeated measures analyses of variance (ANOVA) were performed using SPSS version 10. Between group comparisons were conducted using a series of one-way ANOVAs. Paired *t*-tests were conducted as planned comparisons to examine differences between baseline symptom ratings and symptom ratings at the other four measurement points.

### **Results**

Baseline characteristics of the three groups are shown in Table 1. There was no significant difference between the three groups on: age, BMI, years smoked, cigarettes per day, ratings of nicotine dependence, CO concentration, number of hours abstinence, and motivation to quit.

*INSERT TABLE 1 ABOUT HERE*

Heart rate records demonstrated high compliance with the moderate and light intensity exercise conditions. After 2.5 minutes of exercise all heart rates were within the prescribed range. Within the light exercise condition 100% of participants perceived exertion ratings were between 6 (no exertion) to 11 (light) at one minute ( $M = 8.7$ ,  $SD = 1.8$ ) and four minutes ( $M = 9.0$ ,  $SD = 1.4$ ) into the exercise. In the moderate exercise condition at 1 minute 51.1% rated exertion between 13 (Somewhat hard) to 15 (Hard, heavy) ( $M = 13.3$ ,  $SD = 1.3$ ), and at 4 minutes 73 % of participants rated exertion between 13 (Somewhat hard) to 17 (Extremely hard) ( $M = 13.4$ ,  $SD = 1.7$ ).

*INSERT TABLE 2 ABOUT HERE*

For ease of exposition the results of the repeated measures ANOVA's for the 8 mood and tobacco withdrawal symptoms are tabulated and presented in Table 2. There were significant main effects of Group for desire for a cigarette, depression, and strength of desire to smoke. There were significant main effects of time for desire for a cigarette, irritability, tension, restlessness, stress and strength of desire to smoke. Self reported depression was not found to change over time, although results were approaching significance ( $p = .05$ ).

Significant Group by Time interactions were found for desire for a cigarette, irritability, tension, restlessness, difficulty concentrating, stress and strength of desire to smoke. Mean ratings for each of the 8 mood and tobacco withdrawal symptoms are shown in Figure 1 (a-h).



*INSERT FIG 1 (a – h) ABOUT HERE*

Planned comparisons across the groups indicated there was no significant difference in ratings of desire for a cigarette at baseline or at 10 and 15 minutes, but there was a significant difference at 2.5 and at 5 minutes. In both cases, the moderate exercise group gave lower ratings relative to the control and light exercises. There was no difference between the light exercise and control participants at any time point.

Significant group effects were found at 2.5, 5 and 10 minute for depression. At 2.5 minutes the light exercisers gave lower ratings of depression relative to the control and moderate exercises. At 5 minutes there was no difference in depression ratings between the light and moderate exercise groups, but both groups gave lower ratings compared to the controls. At 10 minutes the moderate exercisers gave lower ratings of depression relative to the controls, but there was no significant difference in depression ratings between the light exercisers and the controls and moderate exercise group. For strength of desire to smoke there were significant group effects at 5 and 10 minutes. At 5 minutes the moderate and light exercisers gave lower ratings of strength of desire to smoke relative to the controls, but there was no differences in ratings between the moderate and the light exercises. At 10 minutes, the moderate exercisers gave lower ratings relative to the controls, but there was no difference in ratings between the two exercise groups. The light exercise group also gave lower ratings of strength of desire to smoke relative to the controls. As stated above there were no significant group effects for irritability, tension, restlessness, concentration and stress.

*TABLE 3 ABOUT HERE*

Nine paired sample t-tests were calculated to compare measures of smoking withdrawal symptoms between baseline ratings and each respective time period (2.5, 5, 10 and 15 minutes) for all three conditions. These results are presented in Table 3. Due to the number of post-hoc t-tests performed a p-

value of 0.01 was adopted (Bonferroni Correction). As expected, there were no significant differences between tobacco withdrawal ratings over time in the passive control condition. For the light exercise condition, desire for a cigarette, tension, and restlessness at 2.5 and 5 minutes were significantly lower relative to baseline, and strength of desire to smoke was significantly lower at 2.5 minutes. As predicted, the majority of significant differences were observed within the moderate intensity condition: desire for a cigarette and strength of desire to smoke were significantly lower from baseline at 2.5, 5 and 10 minutes as was irritability, tension and stress at 5, 10 and 15 minutes. Poor concentration was significantly lower from baseline at 10 and 15 minutes, while restlessness was significantly lower relative to baseline at all time points. These results are in line with the hypothesis outlined above.

In order to assess differences in scores from baseline relative to each time point across groups, a series of Group (light exercise, moderate exercise, and control) X Time (baseline rating – assessment at 2.5 minutes, baseline rating – assessment at 5 minutes, baseline rating – assessment at 10 minutes, baseline rating – assessment at 15 minutes ) ANOVA's were performed. For ease of exposition these are presented in table 4.

*TABLE 4 ABOUT HERE*

Significant effects were observed for change scores on the desire to smoke question between groups at 2.5 and 5 minutes, no significant differences in change scores were observed at 10 and 15 minutes. Changes in irritability from baseline were significant at 10 and 15 minutes, not at 2.5 and 5 minutes. Depression was not significant at any time point. Tension, restlessness, difficulty concentrating and stress were significant at 5, 10 and 15 minutes, non significant at 2.5 minutes. Strength of desire to smoke was significant at all time points.

## Discussion

Self reported reductions were observed in ratings of a desire for a cigarette, strength of desire to smoke, irritability, tension, restlessness, and perceived stress, during and immediately after individuals performed moderate intensity exercise. Levels of poor concentration did not change during exercise but decreased in the 10 minutes following exercise. These findings are consistent with Ussher et al. (2001) and suggests that after completing a relatively short bout of moderate intensity exercise smoking cravings are reduced. There were reductions in desire for a cigarette, restlessness and strength of desire to smoke, within the light exercisers. These effects were transient and returned to baseline abruptly upon termination of exercise which suggests they may have been the result of distraction or even demand characteristics. As 5 minutes of moderate intensity exercise was examined here necessity meant baseline mood recordings and mood recordings during and at the termination of exercise were taken only 2.5 minutes apart. This may have mitigated exercise effects on mood but even so an effect was still observed.

The present results are also in line with previous research which has reported positive effects of exercise on smoking withdrawal symptoms, (i.e. Grove et al. 1993; Bock et al. 1999). Implementing exercise as an aid to smoking cessation has a number of advantages over more conventional methods for reducing cravings for certain groups of smokers. For example, although NRT is now licensed for pregnant smokers who cannot stop without it, there is no evidence for the effectiveness of NRT in this population and only a small minority of pregnant smokers are likely to be interested in using NRT (Ussher & West 2003). Evidence from surveys suggests that pregnant smokers are motivated towards using exercise as an aid to smoking cessation (Ussher et al 2003). Using exercise as a smoking cessation aid also has the potential added advantage of mitigating weight gain which some smokers report as being a matter for concern (Pomerleau et al. 2000; King et al. 2000).

The mechanism through which moderate exercise effects smoking withdrawal symptoms was not examined in the present study. Efforts were made however to rule out the possibility that reductions in smoking cravings were due to the distracting effects of exercise. The light exercise condition was identical to the moderate exercise condition except with regard to the intensity level of the exercise.

Hence the distraction elements for each condition were the same. Of course this does not completely rule out the possibility that part of the effect was mediated through distraction. A second argument for dismissing the distraction hypothesis concerns the pattern of the ratings of withdrawal symptoms. It may be expected that upon removing the distracting element, i.e., exercising; smoking withdrawal symptoms would return immediately to baseline. This clearly was not the case.

It remains to be determined however what the exact mechanism responsible for the observed effects was. One possibility is that exercising somehow mimics the effects of nicotine, since both smoking and physical activity have been shown to increase plasma catecholamines. Alternatively, the effect may be partly caused by increased common affect and enhanced energy, both central features of mood regulation theory (Thayer et al. 1993). It is important that researchers begin to investigate possible mechanisms if we are to fully understand this phenomena. A starting point would be to include a comprehensive measure of affect, for example the Profile of Mood states (McNair et al. 1971), or the Positive and Negative Affect Scale (Watson et al. 1988). To fully investigate the possibility that mood enhancement reduces desire to smoke an investigation where mood enhancement is attempted compared to exercise would be valuable.

Future research should also examine whether the benefits of exercise as a smoking cessation aid are more pronounced for specific sub-groups of smokers; for example, those highly motivated to remain abstinent or those with a history of regular participation in exercise. It is not known whether the effects of exercise on smoking cravings can be maintained over longer periods. Some studies have shown regular physical exercise to be associated with long-term maintenance of smoking cessation in females (Marcus et al. 1999), while others have found no long term improvements in withdrawal symptoms (Bock et al. 1999). Further research also needs to address the issue of how short term reductions in withdrawal, as demonstrated here, might benefit long term abstinence.

In conclusion, this study indicated that five minutes of moderate intensity exercise was effective at reducing common smoking withdrawal symptoms in sedentary smokers, at least in the short term. Future research needs to examine the mechanisms underlying the effect and explore ways of incorporating exercise into smoking cessation programmes.

**Table 1.** Mean ( $\pm$ SD) values for participant characteristics. *FTND* = Fagerstrom Test for Nicotine Dependence, *ECO* expired carbon monoxide

	Control	Light	Moderate	p-value
Age	31.0 $\pm$ 11.9	29.5 $\pm$ 13.1	29.8 $\pm$ 11.9	ns
BMI	24.4 $\pm$ 3.1	24.6 $\pm$ 3.5	24.1 $\pm$ 3.4	ns
Years Smoked	12.1 $\pm$ 10.5	12.9 $\pm$ 1.3	12.8 $\pm$ 10.8	ns
Cigarettes per day	18.7 $\pm$ 8.3	16.3 $\pm$ 7.3	15.3 $\pm$ 6.5	ns
FTND	4.6 $\pm$ 2.3	3.8 $\pm$ 2.1	3.6 $\pm$ 2.3	ns
ECO	4.5 $\pm$ 2.9	5.7 $\pm$ 2.9	5.4 $\pm$ 2.9	ns
Hours abstinence	13.2 $\pm$ 1.5	13.4 $\pm$ 2.0	13.3 $\pm$ 1.5	ns
Motivation to quit	2.3 $\pm$ 1.39	2.0 $\pm$ 1.26	1.5 $\pm$ 1.3	ns

**Table 2.** F values, degrees of freedom, and probability results for time, group, and time by group interactions; df = of freedom.

	Time			Group			Time *		
	F value	df	P value	F value	df	P value	F value	df	P value
Q1) Desire for A cigarette	22.367	4	<.001*	4.066	2	<.05*	6.323	8	<.001*
Q2) Irritability	6.426	4	<.001*	.078	2	=.925	4.798	8	<.001*
Q3) Depression	2.4	4	.05	4.360	2	<.05*	1.086	8	=.373
Q4) Tension	11.213	4	<.001*	.735	2	=.483	2.813	8	<.05*
Q5) Restlessness	8.495	4	<.001*	1.069	2	=.348	4.218	8	<.001*
Q6) Difficulty concentrating	3.508	4	<.05*	.091	2	=.913	3.430	8	<.05*
Q7) Stress	8.334	4	<.001*	2.265	2	=.110	2.627	8	<.05*
Q8) Strength Of desire to smoke	24.775	4	<.001*	3.966	2	<.05*	8.519	8	<.001*



Fig. **1a-i** Ratings of withdrawal symptoms and desire to smoke at each measurement time (high=7, low=1). **a** Desire to smoke. **b** Irritability **c** Depression. **d** Tension. **e** Restlessness. **f** Difficulty concentrating. **g** Stress. **h** Strength of desire to smoke.

Fig 1. a) Desire for a cigarette

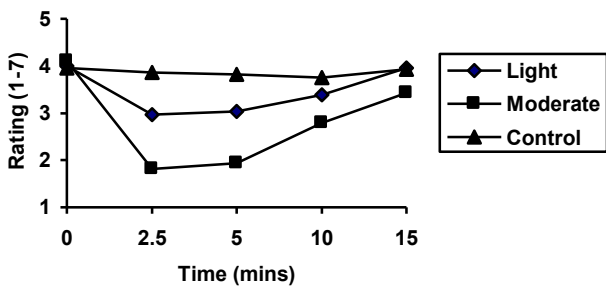


Fig 1. b) Irritability

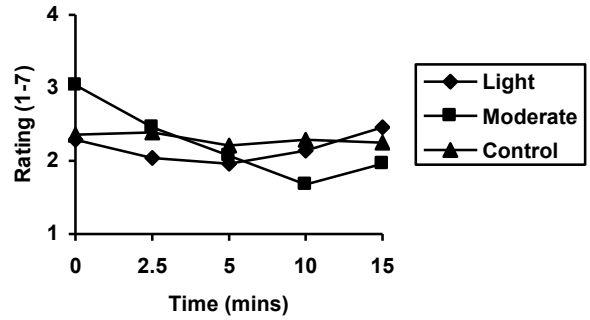


Fig 1. c) Depression

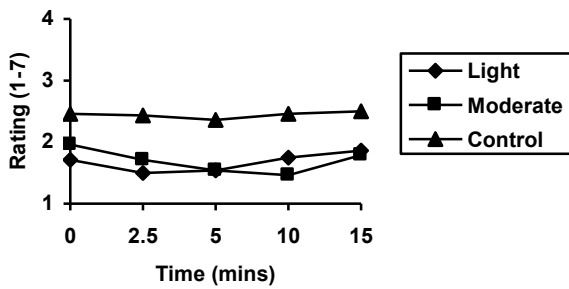


Fig 1. d) Tension

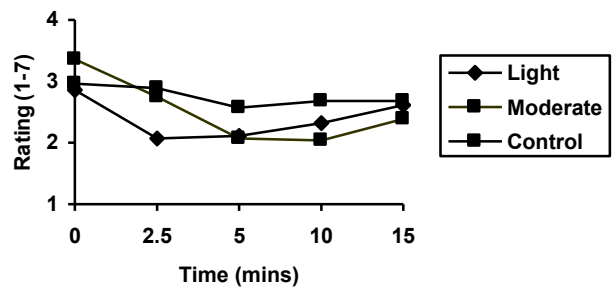


Fig 1. e) Restlessness

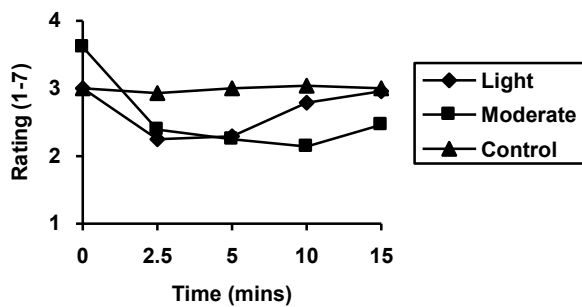


Fig 1. f) Difficulty concentrating

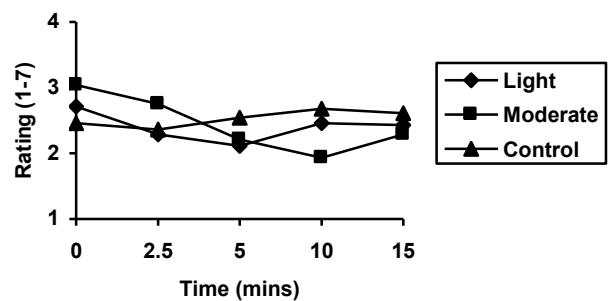


Fig 1. g) Stress

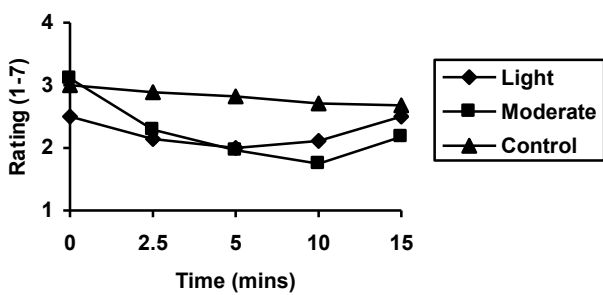
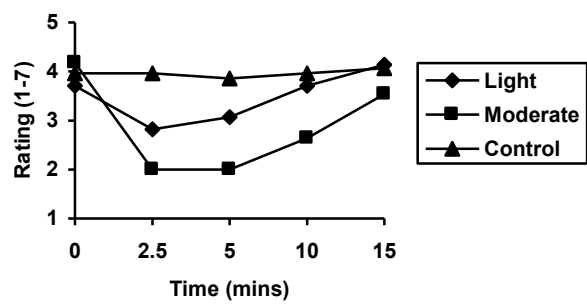


Fig 1. h) Strength of Desire



**Table 3.** Significance levels from paired sample t-tests for comparisons of baseline ratings with each subsequent time period for each symptom; \*\*\* = significantly different from baseline  $p < .001$ ; \*\* = significantly different from baseline  $p < .01$ ; ns = not significantly different from baseline.

			2.5 mins	5 mins	10 mins	15 mins
<u>Q1) Desire to smoke</u>	Control	ns	ns	ns	ns	ns
<u>a cigarette</u>	Light	***	**	ns	ns	ns
	Moderate	***	***	**	ns	ns
<u>Q2 Irritability</u>	Control	ns	ns	ns	ns	ns
	Light	ns	ns	ns	ns	ns
	Moderate	ns	**	***	***	***
<u>Q3) Depression</u>	Control	ns	ns	ns	ns	ns
	Light	ns	ns	ns	ns	ns
	Moderate	ns	ns	ns	ns	ns
<u>Q4)Tension</u>	Control	ns	ns	ns	ns	ns
	Light	**	**	ns	ns	ns
	Moderate	ns	**	***	***	***
<u>Q5) Restlessness</u>	Control	ns	ns	ns	ns	ns
	Light	**	**	ns	ns	ns
	Moderate	***	***	***	***	***
<u>Q6)Concentration</u>	Control	ns	ns	ns	ns	ns
	Light	ns	ns	ns	ns	ns
	Moderate	ns	ns	***	**	**
<u>Q7 Stress</u>	Control	ns	ns	ns	ns	ns
	Light	ns	ns	ns	ns	ns
	Moderate	ns	***	***	**	**
<u>Q8)Strength of desire</u>	Control	ns	ns	ns	ns	ns
<u>to smoke a cigarette</u>	Light	**	ns	ns	ns	ns
	Moderate	***	***	***	ns	ns

**Table 4.** F values, degrees of freedom, and probability results for change scores across three conditions;  
df = degree's of freedom.

Change scores (from baseline rating	2.5m	5m	10m	15m
-	(df = 2)			
Q1) Desire for a cigarette	F=13.693 <b>p&lt;.001</b>	F=10.259 <b>p&lt;.001</b>	F=8.036 P=.096	F=2.410 P=.602
Q2) Irritability	F=1.588 P=.211	F=3.432 <b>P&lt;.05</b>	F=10.912 <b>P&lt;.001</b>	F=4.827 <b>P&lt;.05</b>
Q3) Depression	F=.560 P=.693	F=.368 P=.368	F=1.809 P=.170	F=.709 P=.495
Q4) Tension	F=1.173 P=.315	F=4.065 <b>P&lt;.05</b>	F=6.486 <b>P&lt;.05</b>	F=3.397 <b>P&lt;.05</b>
Q5) Restlessness	F=2.158 P=.122	F=3.182 <b>P&lt;.05</b>	F=6.715 <b>P&lt;.05</b>	F=3.565 <b>P&lt;.05</b>
Q6) Difficulty concentrating	F=.747 P=.477	F=5.135 <b>P&lt;.01</b>	F=10.127 <b>P&lt;.001</b>	F=3.372 <b>P&lt;.01</b>
Q7) Stress	F=1.040 P=.358	F=4.398 <b>P&lt;.05</b>	F=7.951 <b>P&lt;.01</b>	F=8.797 <b>P&lt;.001</b>
Q8) Strength of desire to smoke	F=26.457 <b>P&lt;.001</b>	F=19.725 <b>P&lt;.001</b>	F=13.150 <b>P&lt;.001</b>	F=10.378 <b>P&lt;.001</b>

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