# COPING IN SMOKING CESSATION: IS THERE AN ABSTINENCE MAINTENANCE EFFECT?

**Doctorate in Clinical Psychology 2001** 

# **ADRIAN DZIALDOWSKI**

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# **COPING IN SMOKING CESSATION:**

# **IS THERE AN ABSTINENCE MAINTENANCE EFFECT?**

# ABSTRACT

A possible extension of Marlatt's Relapse Prevention Model was investigated in a population of dependent smokers undergoing cessation treatment. Whereas the Abstinence Violation Effect (AVE) has been well documented as a common attributional response to lapsing into addictive behaviour, an analogous Abstinence Maintenance Effect (AME) was proposed in response to coping with tempting situations. Several hypotheses were tested concerning the development of the proposed AME over time in abstainers and lapsers. Its relationship with self efficacy, craving and coping style was also studied.

Results supported the existence of the AME and suggested it builds in strength over time spent abstinent. Lapsing was shown to be detrimental to this development. While the AME was not shown to be correlated with self efficacy, craving or coping style in the main study, all four variables were related to outcome.

The implications for treatment in the addictive behaviours were discussed.

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#### **INTRODUCTION**

In the treatment of addictive behaviours numerous studies have reported high rates of relapse. Hunt et al (1971) reviewed 84 separate smoking treatment programmes and reported approximately two-thirds of all clients relapsing in 90 days. The same authors reported comparable rates of relapse in alcohol and heroin programmes. Miller and Hester (1980) calculated a relapse rate of above 75% in one year post-treatment for over 500 alcoholism outcome studies. In the treatment of smoking it is calculated that even the most successful treatment programmes report only 35% abstinent at one year follow-up (Foulds, 1996).

A problem of definition arises in comparing relapse rates across studies. Some authors have taken any resumption of an addictive behaviour after a period of abstinence to constitute relapse. Others have used a return to previous levels of use as relapse criteria. Clearly there is a qualitative difference between an isolated lapse and a full-blown relapse. However, the consensus amongst reviewers is that relapse as a return to uncontrolled use is the most common outcome in treatment in the addiction field (De Jong, 1994; Catalano et al, 1988; Simpson et al, 1986).

A response to this high level of recidivism has been to view it as part of an overall process. Prochaska and Di Clemente (1983) put forward the concept of a "cycle of change" in addiction. They propose that addicted individuals can be characterised according to the stage they have reached in the cycle. Individuals who are participating in treatment or in other attempts to address their addiction are described as "active". Prior to reaching this stage they typically proceed from "precontemplative" through "contemplative" to "preparation" for change. Relapse is viewed as a common but not inevitable stage in the process, which can result in a return to a previous stage in the cycle (See figure 1 below).



Figure 1: Stages of change in addiction (after Prochaska and Di Clemente, 1983) This model has proved attractive to both clinicians and clients in the addiction field. It does provide an eloquent description of the typical clinical context where frequently clients express ambivalence about change (contemplative), often require a preparation period to attempt change, and, as described above, frequently relapse.

The cycle of change approach has been criticised in that since it does not require clients to pass through all the proposed stages sequentially, it is not useful in predicting behaviour (Bandura, 1997). Similarly, it takes no account of the role of self-efficacy in behavioural change. Finally, it does not lend itself to empirical testing, and can at worst be seen as a largely semantic exercise in re-labelling common treatment experiences; e.g. precontemplation could also be interpreted as poor motivation. The attraction of the model is perhaps due to its refusal to view relapse as the end point in most treatment. It therefore implies hope for clients and clinicians who are attempting to look beyond initial lapse or relapse episodes. It has also prompted the formulation of a promising recent programme which aims to match varying levels of counselling intervention with the particular motivational stage that the client has reached (Annis et al, 1996).

The relapse prevention (RP) model (Marlatt and George, 1984) also views relapse as an active process. It assumes addicted individuals who are maintaining a period of abstinence are well motivated and experience a sense of control over their addiction. The extent of this perceived control increases with the length of the abstinence period achieved, and persists until a high risk situation is encountered, where the individual is tempted to break abstinence. According to the RP model, whether or not abstinence is maintained is dependent on the level of coping skills the individual is able to implement in the situation. Successful coping is thought to increase self-efficacy at remaining abstinent in the future, and to decrease the likelihood of future lapse or relapse episodes. Alternatively, if adequate coping skills are not employed in the crisis situation, the RP model suggests a lapse of abstinence will occur which will produce an Abstinence Violation Effect (AVE) in the individual. This has two components. The first involves a cognitive dissonance effect. It

occurs because individuals are faced with a pre-existing set of cognitions about themselves which does not match their current behaviour. For example, their image of themselves as non-drug users may fail to match with the drug-taking behaviour precipitated by the lapse. This creates an internal source of stress, increasing the likelihood of further drug taking as a method of achieving relief.

The second component of the proposed AVE involves attributions regarding oneself. The perceived failure of the initial lapse is attributed to internal causes such as self-weakness. In addition these causes are perceived as stable in that they decrease confidence in coping with similar situations in the future. Finally, there is a global dimension to these proposed attributions for lapsing, which is said to relate to other areas of the individual's life than addiction (Curry et al, 1987). Such self-attributions are thought to greatly increase the probability of the initial lapse leading to a return to regular drug use. The strength of the above AVE is thought to increase with the length of the period of abstinence being violated. The RP model is summarised in Fig 2 below.



Figure 2 Relapse Prevention Model (Adapted from Cummings, Gordon and Marlatt, 1984 p298)

While the RP model has been hugely influential in shaping treatment approaches to a variety of addictive behaviours, relatively few studies have tested the model. In the alcohol treatment field Miller et al (1995) cites seven studies where the primary focus was relapse prevention. Three of these (Caddy et al, 1984; Chaney et al, 1978; O'Farrell et al, 1993) supported the efficacy of RP related interventions, while four (Annis and Peachey, 1992; Obolensky, 1984; Rosenberg and Brian, 1986; Skuttle and Berg, 1987) reported mixed results. In two of the latter cases the RP intervention, while producing positive results, was less effective than other treatments in the design.

In a more extensive review across various addictions including alcohol, tobacco, marijuana, cocaine and opiates, Carroll (1996) summarised the findings of 24 randomised controlled trials of relapse prevention interventions. She also concluded that while there is evidence for the effectiveness of RP treatment when compared with no treatment controls, there are mixed findings when it is compared to other active treatments. More promisingly, she argues that RP interventions do appear more effective in moderating the intensity of relapse episodes, improving long-term treatment outcome and in interventions with particularly severely dependent participants.

Using a meta analytic approach, Irvin et al (1999) reviewed largely the same studies as Carroll (1996) above, and similarly found RP treatment effective in both reducing substance misuse, and in improving psychological adjustment, especially in relation to alcohol problems.

Another recent review (Dimeff and Marlatt, 1998) describes five additional comparative studies of RP treatments. Four of these were again in the alcohol field (Project MATCH Research Group, 1997; Ouimette et al, 1997; Jaffe et al, 1996; Allsop et al, 1997). While the first two again reported no differential efficacy between the positive outcome effects on all treatments evaluated, the latter study did report significantly beneficial outcomes in the RP group at 6-month follow-up. However, these differences (in median time to lapse

and relapse) were no longer significant at 12-month follow-up. The remaining alcohol study (Jaffe et al, 1996) again did not exhibit differential effectiveness on outcome variables but the RP group showed significant improvement in associated cognitive variables.

The final outcome study reviewed by Dimeff and Marlatt (1998) is Schmitz et al (1997). This comprised a comparison of group-based and individual RP intervention with cocaine dependent outpatients. Statistically significant gains were reported in both conditions.

Research which has focussed on components of the RP model can be divided into studies which investigate precipitants to relapse and those which focus on the attributional consequences predicted by the model. Of the former an early study by Marlatt and Gordon (1980) identified categories of antecedents which accounted for 72% of initial lapses across a variety of addictive behaviours. These were; negative emotional states, interpersonal conflict and social pressure. The existence of such a clear classification scheme to categorise high-risk situations leant considerable support to the model, however recently some studies have failed to reproduce the high levels of inter rater reliability reported in the above study (Donovan, 1996; Longbaugh et al, 1996). The latter authors suggest that the model is too simplistic in this respect and should take account of detailed characteristics of the individual and of the situation which are likely to interact to either increase or decrease the likelihood of relapse.

This tendency to expand the RP model to provide a more complex theory of relapse is mirrored in the work investigating its attributional aspects. By far the larger proportion of such studies attempt to demonstrate the existence of the proposed AVE. Again, a study by Marlatt and his colleagues provides evidence in support of this aspect of the RP model. Curry et al (1987) reported that cigarette smokers attempting abstinence demonstrated internal, stable and global attributions, both while still abstinent in response to hypothetical lapse situations and retrospectively to subsequent actual lapse situations. those participants who relapsed after a slip produced significantly higher AVE reactions than those who regained abstinence.

These findings supported not only the existence of the AVE but also its predicted role in facilitating relapse. In a similar study, O'Connel and Martin (1987) both of these findings were replicated.

While not all studies have confirmed either or both of these findings (e.g. Birke et al, 1990; Schoenman et al, 1988) the majority are in support of the AVE as proposed by the model. Walters (1996) cites fourteen studies which have tested the AVE across a variety of addictive behaviours including smoking, alcohol abuse, marijuana inhalation, and eating disorders, and concluded that 71% yielded results consistent with the AVE construct.

While the majority of attention has been directed at the role of the AVE in facilitating relapse, relatively little research has focussed on the opposite arm of the model, where the individual copes with a high risk situation. The model proposes;

".... if the individual is able to execute an adaptive coping response and master the source of potential danger, his sense of self-control should increase and expectations of being able to cope should generalise to future high risk situations" (Cummings, Gordon & Marlatt, 1984, p 297)

Some evidence to partially support this suggestion was provided by the Curry et al (1987) study discussed above. Here participants were also asked about prospective temptation or high-risk situations where they did not smoke. The authors report that these hypothetical non-smoking outcomes were associated with internal stable and global attributions, a result consistent with the above prediction.

A further investigation of temptation episodes in dependent smokers attempting abstinence is provided by O'Connell and Martin (1987). Employing the classification scheme originally formulated in relation to relapse episodes by Marlatt and Gordon (1980) described above, and using retrospective interview procedures, the authors reported that highly tempting episodes which led to relapse were qualitatively different from those that were followed by continued abstinence. While the latter were likely to involve smoking related cues, relapse was more likely to follow coping episodes which involved negative affect. The response to coping situations predicted by the RP model is challenged by these findings as they suggest coping does not inevitably lead to a decreased probability of relapse. Instead coping may be more complicated than the model suggests.

Shiffman (1984a), who gathered data from ex-smokers who telephoned a relapse prevention hotline also obtained apparently opposing results to those predicted by the RP model. While those who had lapsed reported drops in self-efficacy in line with the predicted AVE, so did individuals who had survived the relapse crisis in that they had not smoked. Shiffman's sample was open to bias in that it constituted ex-smokers who actively sought help during or soon after a high-risk situation. It could be argued that only ex-smokers who experience particularly aversive coping scenarios do not feel more confident about coping in the future. Even so, these findings also suggest that coping is more complicated than the RP model initially explains.

If not all coping is adaptive then it may be that aversive coping is a particularly powerful trigger to relapse. Since RP treatment encourages individuals to expect increases in confidence when they have coped with difficult situations, the opposite experience would appear potentially disheartening. A scenario where an individual abstains despite intensive and protracted craving might be interpreted as "So I did not smoke in that situation, I really wanted to, I'll never keep this up". The opposite effect predicted by the model in response to coping then seems perfectly possible. If so, it may be that certain types of coping are more likely to produce an adaptive response than others. Using similar methodology as

above Shiffman (1982), reported that while performing any coping response in a crisis situation was a crucial factor in preventing relapse, a combination of cognitive and behavioural responses was the most successful strategy. Shiffman (1984b), replicated this finding in an extension of the sample and also reported that cognitive coping strategies involving willpower and self-punitive responses were especially ineffective.

Another possible factor in the interpretation of coping responses is the level of avoidance used. In the alcohol field Moser and Annis (1996) found that the exclusive use of active rather than avoidance strategies was more positively associated with abstinent outcome. Interestingly, the authors relate their findings to that of Shiffman (1984b) described above. It seems "willpower" was a central component to the avoidant coping in the Moser and Annis study. Participants in this study who were classified as "cognitive avoidant copers" were effectively relying on their own internal strength as opposed to making any active alternative responses. While there is some doubt as to whether the "cognitive avoidant copers" here are describing the same behaviour as those attributing their coping to willpower in Shiffman's study, it does seem possible that both subgroups of participants were describing an aversive state of coping. It also seems unlikely that such a strategy could be attributed as stable unless one assumes a limitless supply of willpower. Again, the contrary interpretation to that predicted by the RP model, that one is only just "hanging on", seems at least possible.

Indeed the attribution process in coping may be especially relevant. A study by Harackiewicz et al (1987) studied the relationship between attribution for success in treatment and smoking cessation, by using externality of the treatment process as an independent variable. Self help manuals were used in conjunction with three levels of a "motivational orientation" variable and a minimal intervention control group. Two of the latter conditions (intrinsic self-help and intrinsic gum) focussed attention on the individual's own efforts, the third on the external attributes of the programme. The results suggested causal attributions affect outcome in that abstainers tended to take more credit

for their success. From these findings it would appear that successful coping may also be linked to the individual's attributional process.

To return to the RP model (fig 2 above). The model predicts that the AVE following a lapse produces attributions which are internal, stable and global. Surely if following a coping response one is to experience an increase in self-efficacy as predicted by the RP model, then an analogous effect to the AVE, an abstinence maintenance effect (AME) would be necessary. In other words the ex-smoker must interpret their coping behaviour as internal, stable and global. In this way they can have confidence that they will be able to cope with future high risk events as the ability to resist lies within themselves, is under their control, will always be there, and is trait-like in that it applies to other areas of their life than smoking. As argued above it would seem that willpower is unlikely to be defined as stable by most individuals. Also, avoidance seems unlikely to be a stable strategy due to the amount of situations one can associate with smoking. Furthermore, it implies a certain loss of activities which the ex-smoker would normally enjoy, which if taken to be permanent would seem likely to lower mood and make further demands on willpower.

Three other studies have specifically focussed on the role of attributions towards successful coping. Walton et al (1994) compared the attributions of illicit drug (stimulants) users in treatment, for abstinence, lapsing and relapse episodes. Attributional data was gathered in retrospective interviews. The results showed abstainers to make internal, stable and global attributions towards their abstinence, thus supporting the proposed AME above.

Only two studies to date have directly investigated whether abstinent ex-smokers make attributions similar to the AVE towards coping situations. Schmitz et al (1993) used a sample of 36 smokers entering a six week smoking cessation programme. Twenty-six participants provided responses to self-report measures of attribution and self-efficacy during treatment, at end of treatment, and at three points in the eight weeks following the initial six week cessation programme. Participants were asked to focus on a recent situation in which they had not smoked despite experiencing a strong urge to do so. Three separate scales measuring internal, stable and control attributions then followed. Participants were classified as either quitters or smokers on the basis of three month follow-up assessment. While participants' attributions for success were not predictive of actual outcome, significant differences between the two groups existed on attributions regarding actual coping responses, with those abstinent at follow-up being more likely to make internal, stable and global attributions, and to report higher self-efficacy to previous coping situations than recidivists. As the authors state, these findings are provocative in that they suggest there may be an attribution process taking place in coping behaviour which is analogous to that in lapsing. In short, as suggested above, an Abstinence Maintenance Effect (AME) may exist. If so, the AME may be important in the development of self-efficacy, itself significantly correlated to positive outcome (Baer, et al, 1986).

Finally, in an attempt to test whether some behaviours which are overtly coping responses, in that the individual does not resume smoking, are being internally interpreted by participants in similar ways as lapses, i.e. producing an effect similar to the AVE, Shiffman et al (1997a) also used a sample of smokers participating in a research based smoking cessation programme. To attempt to eliminate any bias produced by retrospective recall procedures, an innovative design was used involving training clients to make immediate responses on palm-top computers. The study produced mixed results. While AVE responses were specific to lapse episodes rather than temptation (coping) episodes, no increase in self-efficacy was detected subsequent to coping, either in those who went on to lapse or those who were to maintain abstinence.

The apparently conflicting results of Schmitz et al (1993) and Shiffman et al (1997a) require further investigation. Consequently the current study intends to test the following hypotheses with a group of smokers who attempt cessation.

- Coping and lapsing will produce the proposed Abstinence Maintenance Effect (AME) and Abstinence Violation Effect (AVE) respectively.
- 2. The AME will build in strength over time spent abstinent.
- 3. Lapsing will interfere with the development of the AME.
- 4. The proposed AME will be positively correlated with self-efficacy and negatively correlated with craving.
- 5. "Avoidant coping" will be less likely to produce an AME than adaptive coping.

### The need for a pilot study

A pilot study was deemed necessary to address several methodological problems anticipated in attempting to test the above hypotheses.

Firstly, since the proposed AME is thought to build in strength with time spent abstinent, the study required access to a cohort of smokers attempting abstinence, who succeeded for a sufficient time for the proposed increase in AME to be demonstrated. It became necessary then to choose a treatment option likely to increase abstinence rates beyond that which could be expected by self quitters. Nicotine replacement without any other treatment input has been shown to double the self-quit rate of 5% (12 month follow-up outcome). By using nicotine replacement in the current context of Withdrawal Orientated Therapy (WOT), where facilitators encouraged responsibility to the group, and where there is little didactic input, success rates at one year follow-up have been further improved to 27% (Foulds, 1996; Hajek, 1994a). Since WOT typically involves only a few weeks postcessation treatment window it was necessary to extend this to allow enough time to adequately test hypothesis 2. Since simply following participants after the end of treatment seemed likely to reduce the quality of data obtained due to attrition, RP sessions were added in an attempt to improve participants' retention in treatment and as they have been suggested as a potentially useful adjunct to WOT (Hajek, 1994b). Unfortunately this did complicate the methodology in that their presence could possibly influence the attributional processes the study set out to measure (Harackiewiez et al, 1987). To minimise any potentially confounding effect of the RP input no attempt was made to modify attributions within treatment sessions.

A second problem involved the measurement of the proposed AME and the AVE. Studies have not been consistent in either measurement methods or interpretation of Marlatt and Gordon's original concept of the AVE. Some studies have used prospective estimations of hypothetical situations (e.g. Curry et al, 1987) but most have incorporated retrospective designs (e.g. Shiffman, 1982; Borland, 1990; Grove, 1993; Schoenman et al, 1988; Birke et al, 1990). Length of the recall period in these studies has varied greatly and recently Shiffman et al (1997b) has criticised the reliability of this approach. Unfortunately few studies have the resources to employ the palmtop computer data collection procedures described in Shiffman et al (1997a) and indeed this method was first published after the current pilot study began. Consequently it was decided to minimise recall bias by employing specially designed daily diary logs. This choice of instrument largely precluded the use of open-ended instruments as have been used by Bradley et al (1992) and Harackiewicz et al (1987) as this would have made the instrument too cumbersome for repeated daily use. However, although most previous studies have used Likert scales to measure attributions these have varied from four point (Shiffman et al, 1997a) to eleven point (Grove, 1993). Again for the purposes of keeping the instrument compact the former four point scales were chosen.

A further problem of measurement arose from the apparent confusion in the literature concerning the proposed AVE. An early description by Marlatt suggests;

"Thus, if a relapse occurs, the alcoholic is likely to infer a lack of willpower or personal control as the determinant of the relapse. If the relapse is viewed as a personal failure in this sense, the individual's expectancy for continued failure will increase as a result". (Marlatt, 1978 p299) While the elements of internality and stability have remained a constant feature in attempts to demonstrate the AVE the aspects of controllability and globality have been less consistently included.

The meaning of the global dimension has also been interpreted differently by a variety of authors. Walton et al (1994) defined it as believing that abstinence is;

".... generalisable to other substances (than cocaine)" (p320). Whereas Dimeff and Marlatt (1998) define global as "....this kind of event will re-occur in other situations and cues" (p 518). However, the majority of studies (e.g. Curry et al 1987; Grove 1993; Stephens et al 1994; Schoenman et al 1988; Birke et al 1990; Grilo & Shiffman 1994) have employed Likert scales of the type; ".... influences only my ability to stop smoking/influences many events in my life", to measure the specific/global dimension. Such confusion has also been evident within some studies. Shiffman et al (1997a) reports dropping the global item when the ex-smokers in his pilot study could not understand it. Similarly Schmitz et al (1993) assessed the AVE over three individual scales measuring internality, stability and controllability, and averaged them into one composite AVE construct.

Since the primary purpose of this study was to investigate whether the Abstinence Maintenance Effect in response to coping, analogous to the AVE proposed by Marlatt in response to lapses, could be demonstrated, it was decided to adhere to the traditional definition of the AVE construct as described by Curry et al (1987).

".... Causal attributions for a slip focus on internal, stable and global factors that are perceived to be uncontrollable". (Curry et al 1987, p 145)

#### METHOD AND PROCEDURES

The procedures described below were integrated into the formation of a new treatment programme for heavily dependent smokers in the Cambridge area. The initial group was intended as a pilot project to establish the extent of local demand for the service, and to assess the impact the treatment had on recipients. It also provided an opportunity to pilot the research instruments described below.

### RECRUITMENT

Participants responded to various local media coverage of the Cambridge Stop Smoking Group. The three groups were run as follows; (pilot group: April - August 1997; main group A: February - June 1998; main group B: November 1998 - February 1999). A maximum of 25 clients were invited to attend the first introductory session. Inclusion criteria were age 25+, minimum daily smoking rate of 15 cigarettes per day, minimum smoking history 5 years, English speaking, informed consent to use of nicotine gum and participation in the project (GP informed). The pilot group was free to participants. Main groups A and B involved a £20 registration fee which was returnable to those dropping out before or during the first session. All group sessions were held on Monday evenings.

### PROGRAMME

The first session was used to introduce the methods and procedures employed in subsequent sessions. Participants were informed that those remaining would be required to stop smoking before the second session two weeks later. Over the next five sessions (usually weekly) the withdrawal orientated therapy approach (Hajek, 1994a) was used to help participants maintain abstinence. This is a well established treatment programme and each of the group facilitators (three per group) received prior training in this approach. As the name implies, withdrawal orientated therapy emphasises the important role nicotine replacement has in minimising withdrawal discomfort, particularly in the early stages of treatment.

The final four sessions were held fortnightly and comprised relapse prevention techniques, designed specifically for this project. Content of these included; explanation of relapse prevention model, training in identifying and dealing with high risk situations, similar training in minimising the extent of any lapse, and a discussion of long-term strategies in dealing with stressful life events and developing a balanced lifestyle. As stated above, since the current study was concerned with participants' attributions towards coping no attempt was made to modify attributions within the treatment programme.

### **MEASURES**

### **Baseline Questionnaire**

All smokers contacting the project were sent questionnaires to complete and return along with details of the treatment provided and research objectives of the study. The former served as a screening device and was obtained from the Helping Smokers Give Up course at St Bartholomew's and the Royal London Hospital Medical College. It included items on demography, smoking and treatment history, motivation and possible contra-indictors for nicotine replacement products. In addition, it provided a comparative measure between successive treatment groups.

### Carbon monoxide monitoring

After the initial introductory group session, sessions began by measuring expired carbon monoxide (CO) from participants, using Bedfont EC50 smokalysers. It was explained to participants that this procedure gives a reliable indication of any smoking within the previous 36 hours. A cut off point of below nine parts per million was used to identify a non-smoker.

### **Daily diary logs**

These were designed specifically for the current project. Instructions on how to complete them were given in session 1, and they were issued at the end of each session and collected at the beginning of the following one. As well as items on smoking and nicotine replacement consumption, participants were asked to complete Likert scales measuring internal, stable and global attributions to coping and lapse situations. Self efficacy and perceived control were also reported in this way. Craving was measured on a ten point scale as was a second measure of self efficacy. Coping strategies were measured by open ended items (Appendix I).

# **RESULTS OF PILOT STUDY**

### PARTICIPANTS

Twenty-five participants initially agreed to take part in a group with twenty-two actually beginning an attempt to quit in session 2. Thirteen were female (59.1%) and nine male (40.9%). Mean age was 44.4 years, SD 12.88. Mean smoking history was 26.8 years, SD 12.3. Mean number of previous attempts to quit in the five years prior to treatment was 2.55, SD .74. Mean self-reported daily smoking rate was 21.61, SD 5.49.

### **ATTRITION AND NON-COMPLIANCE**

Three participants did not attend beyond session 2 when the primary data collection began. Consequently 19 participants (86.4%) in this group provided at least one diary, and an overall total of 130 diaries were submitted throughout the treatment period. Figure 3 below shows the attendance at each of the 10 sessions spread over 13 weeks between quitting day (session 2) and the final session 10.

### **OUTCOME DATA**

At the end of treatment, 5 of the 22 (22.7%) beginning treatment were abstinent. Outcome status is based on continual abstinence in last 7 days of treatment, self report verified by expired CO. There was 100% concordance between self report of smoking status and expired CO.

## LAPSE DATA

Four of the 19 participants submitting diary logs were abstinent throughout the treatment period. Since some participants lapsed repeatedly over short periods, only lapses preceded by 7 abstinent days (valid lapses) were included for analyses. A further 7 participants failed to hand in lapse data fulfilling this criteria. Of the remaining 8 participants, data on between 1 and 3 valid lapses were submitted, making a total of 15.







# MULTIPLE STATISTICAL ANALYSES

As much of the analysis involved the testing of repeat measures it was necessary to use multiple tests on some data, e.g. Table 2. This created a problem in that the probability of obtaining spuriously significant results was increased. To minimise this only results significant at the .01 level were accepted as such. Those at the .05 level were thus treated with some caution.

### **Hypothesis** 1

Following Schmitz et al (1993), the three Likert attribution scales relating to the proposed AME and AVE were averaged into one score. A mean over 2.5 indicates endorsement of the proposed effect (range 1 - 4).

As can be seen from Table 1 below, both AVEs and AMEs were exhibited in the pilot group in response to lapsing and coping situations respectively. A degree of support then is available for hypothesis 1. Responses to the perceived control and self efficacy items were also in the predicted directions. Coping situations produced reports of control and increased self efficacy, and lapses produced the opposite response. As none of the above variables was found to be normally distributed all subsequent analyses used non-parametric tests.

# Table 1

<u>Coping situations</u> (	n = 763)	<u>Lapse situations</u> $(n = 15)$					
Internal	3.61	Internal	3.35				
Stable	3.28	Stable	2.65				
Global	3.33	Global	3.03				
Total AME (Mean)	<u>3.40</u>	Total AVE (Mean)	<u>3.01</u>				
Perceived control	3.56	Lack of perceived control	3.05				
Increased self efficacy	3.17	Decreased self efficacy	2.72				

NB: 4 point Likert items coded 1 - 4; 2.5 = neutral midpoint, > 2.5 = endorsement of item

# Table 1: Mean responses over five Likert itemsin coping and lapsing situations in pilot group

### Hypothesis 2

In order to address hypothesis 2, that the AME would increase over time spent abstinent, the four cases who remained abstinent over the entire treatment period were plotted in figure 4. Each plot represents the weekly average AME reported for the individual case.

Case 1A fluctuates above and below the neutral midpoint of 2.5. However, it shows an increased AME over time and 9 of the 13 weekly means are above the midpoint. Case 1B decreases AME over the treatment period but consistently endorses the AME. Case 1C exhibits a ceiling effect after only three weeks of treatment, but again endorses the AME. Case 1D has considerable missing data which is represented by a dotted line, but again seems to exhibit a ceiling effect endorsing the AME.

The evidence available from this subgroup of abstainers is inconclusive but does provide tentative support for hypothesis 2 that the AME will increase over time spent abstinent.





abstainers over the treatment period



for pilot group lapsers over the treatment period



### Hypothesis 3

Hypothesis 3 argues that the developing AME is subject to disruption by lapses. This was investigated by plotting the subgroup reporting "valid lapses" (n = 8) as is shown in Figures 5a and 5b above.

Progress is again erratic and data are incomplete, but all 8 cases consistently endorse the AME. Cases 1H, 1I and 1L seem to be making rote responses as their weekly means are the same for most of the treatment period.

Figure 6 below compares weekly mean AMEs between lapsers and abstainers. Wilcoxen Rank Sum W tests were performed between groups on each pair of weekly means. No significant differences were obtained in any of the thirteen tests.

It cannot be concluded that hypothesis 3 is supported by the data.





<u>Figure 6</u>

### **Hypothesis 4**

Table 2 below presents data in support of hypothesis 4, that the proposed AME would be positively correlated with self efficacy and perceived control and negatively correlated with craving. Over the 13 weeks of treatment the mean AME was negatively correlated with mean craving on 12 occasions. Two of these correlations were significant at the .01 level and a further three at .05. The AME was consistently positively correlated with self efficacy and perceived control, statistically significant at the .01 level on three of the 13 tests in the former and one in the latter.

There is some limited support for the hypothesis that the AME recorded is positively correlated with the increase in self-efficacy more commonly associated with coping, and with perceived control, and negatively correlated with craving, or aversive coping.

# <u>Table 2</u>

	WEEKS OF TREATMENT													
	1	2	3	4	5	6	7	8	9	10	11	12	13	
AME/ CRAVING	·21	45	70	83	57	42	60	71	77	83	49	3	-1.0	Spearman correlation coeff
	.508	.14	.024*	.006**	.108	.260	.208	.111	.041*	.021*	.329	.624	.000**	Р
AME/SELF EFFICACY	.64	.60	.91	.90	.69	.42	.89	.50	.13	.64	.57	.82	.32	Spearman correlation coeff
	.024*	.037*	.000**	.001**	.039*	.261	.007**	.253	.75	.12	.18	.089	.68	Р
AME/ PERCEIVED CONTROL	.26	.56	.76	.49	.57	.75	.84	.94	.80	.72	.79	.89	.40	Spearman correlation coeff
	.447	.056	.01*	.19	.083	.021*	.017*	.005**	.017*	.069	.035*	.041*	.60	Р

\* denotes p < .05 \*\* denotes p < .01

Table 2: Spearman correlation coefficients between AME and self efficacy, craving and perceived control for pilot group

# Hypothesis 5

The data yielded by the pilot group concerning coping strategies was ambiguous and insufficient to test hypothesis 5, that avoidance as a coping strategy would be less likely to yield an AME than more adaptive strategies.
### **DISCUSSION OF PILOT STUDY**

The pilot study successfully engaged an adequate proportion of smokers in treatment and generated sufficient data for the purposes of the research. Relapse prevention sessions proved popular with participants and, as can be seen from Figure 3, nine participants (40.9%) attended the last session, 13 weeks after beginning treatment.

Although a few participants alternated between lapsing and abstinence, the definition of a "valid lapse", being one which followed at least 7 days of abstinence worked well, and was retained in the main study. While it was anticipated that defining the end point of a lapse might also prove problematic, this was resolved as participants who exhibited repeated lapses in rapid succession tended to drop out of the study quickly. Such relapsing participants were not followed up beyond an initial letter requesting any completed diaries to be handed in. None were received. Lapses tended to be one or two days in duration, the maximum being one week, and were typically followed by several days abstinent (minimum 5). While lapsers (n = 8) were less likely to remain in treatment than abstainers, only one dropped out of treatment before week 6, and four submitted data up to week 11 or beyond (see Figures 5a and 5b). It seemed likely then that the impact of treatment and the data collection procedures would allow hypotheses 1 and 2 to be adequately tested in the main study to follow.

The diary log designed for this study was only partially successful. Most participants completed and returned them while retained in treatment, and although a few admitted filling them in four or five days at a time, just prior to handing them in at a treatment session, most stated they complied with requests to do so on a daily basis. However, as can be seen by Figures 4, 5a and 5b, several participants seem to respond in a rote fashion. A related problem here was the instrument's insensitivity to change. By employing four point

scales participants had limited scope to vary their responses and this seems likely to have exacerbated the tendency in some participants to make exactly the same response each day.

Despite the reasonable completion rate of the logs, they proved extremely unpopular with participants. The most common complaint concerned the global item where participants were asked to respond to the question, "Does the reason you smoked/did not smoke, in this situation affect other areas of your life than smoking?" Although the mean reported response to this item was in the predicted direction (Table 1) in both coping and lapse situations, it seems participants had a similar problem to those in the Shiffman et al (1997a) study described earlier, in relating this item to their experience. The open-ended items intended to measure coping strategy were also problematic, in that participants largely ignored them.

### MAIN STUDY METHODS AND PROCEDURES

In the light of the pilot study findings discussed above the following changes in methods and procedures were made for the main study.

The range of the Likert scales was changed from 4 to 10 point items.

The wording of the global item was changed to: "Does the reason you smoked/did not smoke in this situation say something about you as a person?"

The diary log was made more user-friendly by changing it from A4 to A5 and folding it into booklet form (see Appendices II).

The open-ended items were replaced in main group B only by the item: "How much did you avoid situations today because you might be tempted to smoke?" Participants responded on a ten-point Likert scale between the pole responses "Not at all/A great deal".

Finally, in an attempt to facilitate the correct and sufficient use of nicotine replacement, nicotine gum was prescribed within sessions to participants at a slightly advantageous price. Two 30-minute instruction and discussion sessions were also incorporated in sessions 2 and 3 by a senior pharmacist.

In all other respects the methods and procedures used in the main study were similar to those in the pilot study described above.

## **RESULTS**

## MAIN STUDY

### PARTICIPANTS

A total of 37 participants agreed to participate in these two groups (main group A and B), with 34 beginning an attempt to quit. Eighteen were females (52.9%) and sixteen males (47.9%). Mean age was 48.1 years, SD 11.24. Mean smoking history was 31.97 years, SD 10.55. Mean number of previous attempts to quit in the five years prior to treatment was 2.35, SD .92. Mean self-reported daily smoking rate was 27, SD 10.18.

### ATTRITION AND NON-COMPLIANCE

At least one completed diary was provided by 27 (79.4%) participants, a total of 212 diaries were submitted over the two treatment periods. Figures 7 & 8 below show the attendance for main groups A and B respectively.

### **OUTCOME DATA**

Using the criteria as described in the pilot group, at end of treatment 6 of the 18 participants were abstinent (33%) in main group A, and 8 of the 16 participants (50%) in main group B. Again the concordance between self reported smoking behaviour and expired CO was 100%.

The procedures and instruments in these two groups were identical apart from the one change described above regarding the avoidance item which replaced open-ended items on coping strategies. No differences were found between groups on any of the above variables and all data in main groups A and B were pooled for analysis.

### LAPSE DATA

Ten participants (29.4%) remained abstinent throughout treatment. Eight participants provided data on one valid lapse each.





Figure 7: Attendance over treatment sessions and time in main group A



Figure 8

## Figure 8: Attendance over treatment sessions and time in main group B

## Hypothesis 1: Coping and lapsing situations will produce the proposed AME and AVE respectively

As can be seen from table 3 below, all three items in coping situations (internal, stable and global) produced means over the mid-point suggesting an endorsement of the proposed AME. (As described above revised 10 point Likert scales were employed in the main study). However, the proposed AVE was not endorsed in lapse situations. The stable item in particular produced responses in the opposite direction predicted, resulting in the overall AVE mean being under the mid-point 5.0. Self efficacy was greater and craving less, in coping situations as expected.

Hypothesis 1 was only partially supported by the data.

Again, the data was found not to be normally distributed and all subsequent statistical tests used were non-parametric.

## Table 3

Coping Situ	ations (η=1,476)	Lapse Situ	Lapse Situations (η=8)			
Internal	7.18	Internal	5.5			
Stable	6.40	Stable	2.43			
Global	7.14	Global	6.75			
TOTAL AME (N	Mean) <u>6.75</u>	TOTAL AVE (I	Mean) <u>4.89</u>			
Self efficacy	7.28	Self efficacy	5.0			
Craving	5.52	Craving	8.0			

## Table 3: Mean Likert (0 – 10 responses) to coping and lapsing situations in pooled main groups A and B

#### Hypothesis 2 – The proposed AME will build in strength over time spent abstinent

Figs 9 & 10 below show abstainers' weekly AME scores over the entire treatment periods for main groups A and B. Fig 9 presents the four abstainers in main group A. Each case exhibits a higher AME at end of treatment than in week 1. The cumulative effect of the AME over time predicted by hypothesis 2 is most marked in cases 2A - C.

Fig 10 presents the 6 abstainers in main group B. A similar effect as above is obtained where the AME builds progressively over time spent abstinent in 4 of the 5 cases presented.

Table 4 below presents the results of Friedman 2-way ANOVAs performed on the pooled data (weekly AME means) of main groups A and B. Again, since repeat measures were being analysed using multiple ANOVAs, only results at the .01 significance level were accepted, with .05 level being treated with some caution. Three of the 10 ANOVAs performed were significant at the .01 level, with a further three significant at .05.

Table 4 does provide evidence in support of hypothesis 2, that the AME increases over time spent abstinent.



Figure 9: Weekly AME for each abstinent case in main group A over the treatment period





Figure 10: Weekly AME for each abstinent case in main group B over the whole treatment period

## Table 4

	FRIEDMAN 2-WAY ANOVAS										
		ABSTA	INERS		LAPSERS						
Weeks into treatment	n	Chi Sq	D F	Р	n	Chi Sq	D F	Р			
3	10	6.59	2	.037*	8	3.16	2	.201			
4	10	6.30	3	.097	8	5.19	3	.158			
5	10	6.40	4	.171	7	8.96	4	.062			
6	10	9.79	5	.081	6	8.69	5	.122			
7	10	12.93	6	.044*	5	9.32	6	.156			
8	10	18.31	7	.011*	5	9.62	7	.211			
9	10	32.52	8	.000**	3	7.43	8	.49			
10	10	25.29	9	.003**	2	9.06	9	.432			
11	10	27.70	10	.002**	2	11.38	10	.329			
12	6	12.86	11	.302	_	-	-	-			

\* = p < .05

\*\* = p < .01

# Table 4: Results of Friedman 2-way ANOVAs, performed within the abstainingand lapsing subgroups on mean AME scores in the pooled main groups A and B,for treatment week 3 to end of treatment

#### Hypothesis 3: Lapses will interfere with the development of the proposed AME

Fig 11 below shows weekly mean AME scores in main group A lapsers over the whole treatment period. After an initial decline in AME, cases 2G and 2H exhibit a recovery. The remaining cases show an overall decline. Fig 12 below shows weekly AME mean scores for lapsers in main group B. There is an overall decline in AME over the treatment period in all three cases. Case 3I consistently fails to endorse the AME and appears to be making rote responses with identical weekly means beyond week 4.

Table 4 above also presents the results of Friedman 2-way ANOVAs performed on the subgroup of lapsers (weekly AME scores) in main groups A and B. No significant results were obtained.

Hypothesis 3, that the development of the AME would be interrupted by lapses was supported by the data.

### Hypotheses 2 & 3

#### Between group analyses

Fig 13 below plots the weekly mean AME scores for abstainers, lapsers, and relapsers in main groups A and B over the entire treatment period. As suggested above, only abstainers exhibit a gradual overall improvement in the AME score.

Limited support for the disruptive effect lapses have on the developing AME is presented in table 5 below. Between group comparisons (abstainers v lapsers) were made using Mann-Whitney  $\mu$  tests. The abstinent group reported higher AMEs in all twelve comparisons, although no tests exhibited a difference significant at the .01 level. Several other tests on the other weekly means produced differences approaching the .05 level. The data suggest that the abstinent group were more consistent in reporting an AME developing over time than the lapsing group, as predicted by hypotheses 2 and 3.

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### Figure 13: Weekly mean AME scores for the subgroups of abstainers, lapsers and relapsers in the pooled main groups A and B over the treatment period



## Table 5

	WEEKS OF TREATMENT												
		1	2	3	4	5	6	7	8	9	10	11	12
ABSTAINERS	Mean AME	6.97	7.43	7.61	7.55	7.62	7.78	7.83	7.97	7.95	8.06	8.05	8.2
	η	10	10	10	10	10	10	10	10	10	10	10	6
LAPSERS	Mean AME	6.52	5.93	5.97	5.72	5.4	6.27	6.04	5.92	6.72	5.96	6.21	4.8
	η	8	8	8	8	7	6	6	7	5	5	4	2
Mann-Whitney	μ	33.5	18.0	22	20	16	16	12	10	13	10	11	2
U test	2-tailed P	.56	.05	.11	.07	.06	.13	.05	.02*	.14	.07	.09	.045*

\* p <.05

 Table 5: Results of Mann-Whitney U tests performed between the abstaining and lapsing subgroups

 on mean AME over each week of treatment

## **Hypothesis 4:** The proposed AME will be positively correlated with self efficacy and negatively correlated with craving

Table 6 below shows Spearman correlation co-efficients and corresponding p values for weekly AME scores and variables thought to be positively correlated (self-efficacy) and negatively correlated (craving). No significant correlations were obtained.

Overall, hypothesis 4 was not supported by the data and the exhibited AME seemed to be largely independent of both reported craving and self efficacy.

To investigate any possible relationship between these variables and subject performance (i.e. lapsing v abstinence) Friedman 2-way ANOVAs were performed within each subgroup. Tables 7 and 8 below show these results. From Table 7 it can be seen that self efficacy does significantly increase over time in the abstinent subgroup. Table 8 shows craving to significantly decrease over time in the abstinent subgroup. In both tables 7 and 8, 7 of the 10 ANOVAs performed within the abstinent subgroup yielded results significant at the .01 level. No significant differences were obtained in the lapsing subgroup.

Figs 14 and 15 below compare weekly means for abstainers and lapsers on self-efficacy and craving respectively. Although the expected relationship between AME, craving and self-efficacy was not obtained, there is evidence that all three are related to subject performance.

### **Between group analysis**

Mann Whitney U tests were performed between lapsers and abstainers on weekly mean self efficacy and craving scores. Only one comparison was significant at the .05 level on each variable (i.e. self efficacy week 11,  $\mu = 8.0$ , p = .0365, craving, week 11,  $\mu = 5.0$ , p = .0335). No differences were detected at the .01 level of significance.

## <u>Table 6</u>

		WEEKS OF TREATMENT											
	1	2	3	4	5	6	7	8	9	10	11	12	
AME/	04	01	25	15	18	20	37	27	35	15	44	48	Spearman coefficient
CRAVING	.856	.976	.258	.52	.50	.45	.136	.29	.198	.597	.114	.23	p value
AME/	.28	.26	.15	.37	.36	.28	.43	.22	.16	.31	.27	.68	Spearman coefficient
SELF EFFICACY	.182	.183	.52	.122	.155	.295	.094	.389	.558	.261	.325	.062	p value

Table 6:Spearman correlation coefficients for AME and craving,and AME and self-efficacy, for the pooled coping data yielded by main groups A and B

## <u>Table 7</u>

	FRIEDMAN 2-WAY ANOVAS										
		ABSTA	INERS		LAPSERS						
Weeks into treatment	n	Chi Sq	D F	Р	n	Chi Sq	D F	Р			
3	10	5.89	2	.053	8	.92	2	.631			
4	10	11.23	3	.011*	8	.50	3	.920			
5	10	12.61	4	.013*	7	1.17	4	.883			
6	10	19.39	5	.002**	6	3.44	5	.632			
7	10	25.56	6	.000**	5	6.48	6	.372			
8	10	25.49	7	.001**	5	7.34	7	.394			
9	10	32.52	8	.000**	3	7.43	8	.491			
10	10	34.38	9	.000**	2	14.84	9	.096			
11	10	39.98	10	.000**	2	14.55	10	.122			
12	6	29.35	11	.002**	-	-	_	-			

\*

p < 0.05 p < 0.01 \*\*

Table 7:	Results of Friedman 2-way ANOVAs, performed within the abstaining
2	and lapsing subgroups on mean self-efficacy scores in the pooled
-	main groups A and B, for treatment week 3 to end of treatment

## <u>Table 8</u>

			FRI	EDMAN	2-WAY A	ANOVAs		
		ABSTA	INERS			LAP	SERS	
Weeks into Treatment	n	Chi Sq	D F	Р	n	Chi Sq	D F	Р
3	10	4.20	2	.123	8	5.07	2	.079
4	10	6.83	3	.078	8	5.47	3	.140
5	10	13.32	4	.010*	7	3.91	4	.418
6	10	16.62	5	.005**	6	2.34	5	.800
7	10	21.73	6	.001**	5	7.78	6	.255
8	10	25.95	7	.001**	5	9.79	7	.201
9	10	40.22	8	.000**	3	12.56	8	.128
10	10	46.81	9	.000**	2	12.74	9	.175
11	10	57.43	10	.000**	2	13.16	10	.215
12	6	32.66	11	.001**	_	_	-	_

\* p < 0.05 \*\* p < 0.01

Table 8:	Results of Friedman 2-way ANOVAs, performed within the abstaining
and la	apsing subgroups on mean craving scores in the pooled main groups
	A and B, for treatment week 3 to end of treatment











Figure 15: Weekly mean self reported craving in lapsers and abstainers in the pooled main groups A and B, over the treatment period

The results suggest that the differences between lapsers and abstainers in self efficacy and craving develop over time in treatment.

## Hypothesis 5: "Avoidant" coping will be less likely to produce an AME than "adaptive" coping

No significant correlations were found between weekly AME and Avoidance scores (group 3 only). Table 9 below shows the results of Friedman 2-way ANOVAs performed within each subgroup on weekly avoidance scores. Avoidance significantly reduces over time only in the abstinent subgroup, where three of the 10 ANOVAs yielded results significant at the .01 level and a further three at the .05 level.

### **Between group analysis**

Figure 16 below shows weekly avoidance ratings (1-10) for abstainers and lapsers.

No significant differences were obtained on Mann-Whitney tests between lapsers and abstainers on reported avoidance in any of the twelve treatment weeks. Again it seems that the difference between lapsers and abstainers in reported avoidant coping, develops over time spent in treatment.

## <u>Table 9</u>

	FRIEDMAN 2-WAY ANOVAs											
		ABSTA	INERS		LAPSERS							
Weeks into treatment	n	Chi Sq	D F	Р	n	Chi Sq	D F	Р				
3	6	3.55	2	.170	3	1.40	2	.497				
4	6	6.16	3	.104	3	1.44	3	.695				
5	6	5.68	4	.224	3	1.56	4	.817				
6	6	6.85	5	.232	2	8.62	5	.125				
7	6	12.54	6	.000**	3	6.48	6	.117				
8	6	17.97	7	.012*	2	11.70	7	.111				
9	6	19.70	8	.012*	-	-	-	-				
10	6	20.80	9	.014*	-	-	-	-				
11	6	25.53	10	.004**	-	-	-	-				
12	6	25.02	11	.009**	-	-	-	-				

\* p < 0.05

\*\* p < 0.01

# Table 9: Results of Friedman 2-way ANOVAs, performed within the abstainingand lapsing subgroups on mean avoidance scores in main group B, for treatmentweek 3 to end of treatment

## Figure 16



Figure 16: Avoidance scores for lapsers and abstainers in main group B over the treatment period

### **Post-hoc analysis**

Finally an attempt was made to focus more closely on the effect of a lapse on AME, self efficacy and craving. Two further hypotheses were tested;

- A) a lapse will be followed by decreased reported AME and self-efficacy, and increased craving.
- B) a lapse will be preceded by decreased reported AME and self-efficacy, and increased craving.

Fig 17 below shows a chronological representation of self reports on these variables. On each graph the first and last plots represent mean values of the week before and after "valid" lapses. The middle two points represent "day before", and "day after" lapses. It does appear from figure 17 that a lapse produces the decrease in AME and self efficacy, and the increase in craving predicted by hypothesis A. One week later levels of all three variables approach those prior to the lapse.

Further evidence for hypothesis A is presented in table 10 below.

Although the changes in AME are not statistically significant, self efficacy does decline significantly after a lapse (at the .05 level) on one of two comparisons, and approaches a similar level of significance on the other. Conversley, craving increases after a lapse, again approaching statistical significance at the .05 level on both comparisons. The opposite effects occur the week after a lapse, with craving similarly decreased, and self efficacy similarly increased, suggesting that the effects of isolated lapses are temporary.

Hypothesis B was not supported by the data, suggesting that lapses are not marked by prior increases in craving or decreases in either AME or self-efficacy.

### Figure 17



Figure 17: Self reported ratings of AME, self efficacy and craving at four points in the lapse process; i.e. week before, week after (means), day before and day after

## <u>Table 10</u>

		PRE-LAPSE	LA	POST-LAPSE		
		Week v Day before before (mean)	Day v Day before After	Week v Day before after (mean)	Day v Week after after	
	$\uparrow$	5	2	3	4	
AME	$\downarrow$	2	6	5	4	
	=	1	0	0	0	
	Р	.15	.12	.89	.67	
	1	3	0	1	5	
SELF-EFFICACY	$\downarrow$	3	4	5	0	
	Ξ	2	4	2	3	
	Р	.75	.07	.046*	.04*	
	1	2	5	6	1	
CRAVING	$\downarrow$	6	1	2	6	
	=	0	2	0	1	
	Р	.53	.09	.059	.035*	

## \* p < 0.05

## Table 10: Results of Wilcoxen matched pair tests on 4 repeated measure comparisons of AME, self-efficacy and craving

#### **DISCUSSION**

The central hypotheses being tested in this study concern the existence of an Abstinence Maintenance Effect (AME) which it was proposed would be analogous to the Abstinence Violation Effect (AVE) outlined by Marlatt and his colleagues (Marlatt, 1978; Marlatt and Gordon, 1985; Curry et al, 1987). Whereas the AVE is thought to partly consist of a response to a lapse of abstinence which involves internal, stable and global attributions, the AME is proposed as involving similar attributional responses to coping with a high risk or tempting situation. Similarly, while the AVE is proposed as a significant factor in increasing the probability that an isolated lapse will progress to full-blown relapse, so the AME is put forward as an important contributing factor to the maintenance of abstinence. It is also being argued that the AME gets stronger over time spent abstinent, and that any lapse will retard its development. Again, this is comparable to the AVE which is thought to have greater impact the longer the period of abstinence that precedes the associated lapse.

It was further suggested that the AME would be highly positively correlated with selfefficacy, whereas the AVE is said to reduce the addicted individual's confidence in regaining abstinence. It was also predicted that the AME would be negatively correlated with craving. Finally, the type of coping employed by the individual was expected to play a part in the development of the AME, with avoidant coping less likely to be associated with it.

The results of the study supported most, but not all, of these predictions. On the whole, the proposed AME was exhibited by participants in the study in response to coping. The mean AME score over 1,476 reported situations was 6.75 (5 = neutral point). Surprisingly the

AVE was not endorsed overall in the 8 lapse situations yielded by the lapsing participants (Table 3).

The small number of lapsers reported suggests some doubt as to the reliability of this finding. Also, it may be that this sub-group of lapsers was atypical in that they stayed within the treatment programme. Since this suggests they had considerable motivation despite their failure, they may also have been especially resistant to the AVE items. The fact that it was only the stable item; "The things that made me smoke in this situation will always be present in the future", that they did not endorse also suggests that they were particularly determined to recover from their lapses. Furthermore, the emphasis the programme put on complete abstinence may have influenced their responses to this particular item (Harackiewicz et al, 1987).

The study produced considerable evidence that the AME does increase with time spent abstinent. From figures 9 and 10 it can be seen that 9 of the 10 abstainers had an increased AME over the treatment period, and figures 11 and 12 show that this effect is much more erratic and not statistically significant in the subgroup of lapsers (Table 4). Similarly, Figure 13 and Table 5 demonstrate the between-group differences in mean weekly AME over time. Despite all three subgroups beginning with a similar mean AME the abstainers respond to successive coping situations by increasingly endorsing the AME while lapsers (and from the limited data provided relapsers) do not.

The expected relationships between the AME and both craving and self-efficacy were not demonstrated, as can be seen by the lack of significant correlations in Table 6. It is unclear why the pilot study should produce such relationships and the main study should not is especially surprising given that all three variables are related to outcome, ie both AME and self-efficacy increase over time in treatment in the abstaining subgroup, but not in the lapsing subgroup (Figures 13 and 14, Tables 4 and 7) whereas both subgroups exhibit the converse effect on the craving variable (Figure 15, Table 8).

The problems described above in eliciting data on the extent of avoidant coping exhibited by participants, limited analysis here to main group B only (n = 16). Again, although the expected correlation between the AME and avoidance was not obtained, lapsers and abstainers did differ in their patterns of avoidance in that only the latter exhibited a significant decrease over time (Figure 16, Table 9).

### **Comparisons with previous findings**

The above findings tend to support those of Schmitz et al (1993) and are largely in conflict with those of Shiffman et al (1997a). The main finding of the former study was that participants who subsequently quit smoking reported higher composite attribution scores in response to coping situations, than those who subsequently lapsed. This is in line with the abstinence maintenance effect (AME) reported in the current study, and also with the differential development of the AME in lapsers and abstainers predicted in hypothesis 3. However, there are important methodological differences between the two studies. The inclusion of the control dimension in Schmitz et al (1993) in place of the global one in the current study has already been discussed, but the sampling procedures in the studies also diverge. The current study employed daily reports and compared the development of weekly mean AME scores between the two subgroups of lapsers and abstainers. Results suggested that the AME only developed in the abstinent group, and between group differences on weekly mean AME scores were all in the predicted direction, although only

suggested that the AME only developed in the abstinent group, and between group differences on weekly mean AME scores were all in the predicted direction, although only two of twelve were significant at the .05 level (Table 5). Schmitz et al (1993) sampled participants' responses on five occasions (during treatment, end treatment, and at follow-ups at two, four and eight week intervals). They report significant differences between groups on the composite attributional score at three of the five data collection points (end of treatment, two week and eight week follow up). The current study also differs with respect to the extent of smoking in the lapsing subgroup, with only extremely occasional lapses being reported compared to a mean smoking rate of 15.11 cigarettes per day in the "reducing" subgroup in the Schmitz et al study. Given this latter difference the current study would further suggest that even extremely limited lapses have the potential to disrupt the developing AME as predicted by hypothesis 3.

The other finding in the Schmitz et al study supported by the current one, is that selfefficacy develops in parallel with positive attributions in smokers, but not in lapsers. This is in contrast to the results of Shiffman et al (1997a) who report no change in self-efficacy following temptation episodes in either those who subsequently lapse, or those who maintain abstinence. This is also contrary to Shiffman (1984a). The authors attempt to explain the latter conflict in findings by suggesting the earlier study had biased selection procedures by sampling only those ex-smokers who were clearly having problems as they had called a relapse prevention hotline. Another possible explanation is that the sophisticated data collection procedure in the later study (Shiffman et al, 1997a) involving palm top computers, required participants to make such immediate responses (90% of participants reported responding to tempting situations within fifteen minutes) that the feel an increased sense of self-efficacy at having successfully negotiated it. A possible improvement to this innovative procedure may be to ask participants to delay responding until they perceive the high-risk situation to be over.

Shiffman et al (1997a) also report a failure to demonstrate predicted effects of the AVE in that AVE intensity was not associated with length of abstinence. However, they did find lapses to be associated with predominantly internal, stable and uncontrollable attributions, as well as an increase in negative affect, and a decrease in self efficacy. The above findings to some extent mirror the experience of the pilot study described above. Here, as in Shiffman et al (1997a) 4 point Likert scales were employed and tended to be insensitive to change. These were changed to ten point scales for the main study, and it is perhaps of note that most studies employing such measures in an attempt to demonstrate the attributional components of the AVE also employ scales with a wider subject choice (Stephens et al, 1994; Grove, 1993; Schoenman et al, 1988).

The lack of correlation in the current study between AME, self-efficacy and craving is also of note. Schmitz et al (1993) also suggest that a cognitive affective process analogous to the AVE may take place in response to successful coping. They argue that while selfefficacy may have the strongest association to outcome, attributions may represent an important contributing factor. Baer et al (1986) also report self-efficacy as highly correlated with outcome but their findings suggested that those who succeed begin with a high baseline level of the variable, quickly exhibit a ceiling effect, and maintain this until follow-up. Although this study does not wholly support this view (figure 14) if this is the case, then despite AME levels perhaps being less predictive of outcome, they may be of more use in a treatment context, where reattributional training offers a potential
intervention (Fösterling, 1985). In any case it is difficult to see how self-efficacy could be enhanced without participants also endorsing the notion that existing coping skills fit in with the proposed AME.

As well as AME and self-efficacy, lapsers and abstainers were differentiated by reported craving (figure 15, table 8). This finding is related to Killen and Fortman (1997) who report that immediate post-cessation craving was highly associated with later outcome. However, in the current study both lapsers and abstainers seem to decrease craving initially, but lapsing seems to have arrested this decline in a similar way as it interfered with the increasing AME described above.

The results did not suggest coping by avoidance impeded the development of the AME as was predicted. This hypothesis was suggested by the work of Moser and Annis (1996) who, in a sample of alcoholics, found that exclusive use of avoidant strategies was significantly less likely to result in positive outcome than exclusively active strategies. Again, the methodology of this latter study is very different from the current one. Avoidance was rated independently as opposed to the current study where participants were asked to rate their avoidance on a Likert item. Perhaps more importantly the nature of the addiction in the study may account for the divergent findings. Cigarette smoking, despite being increasingly socially unacceptable, is still associated with a much wider variety of situations by the newly abstinent individual, than drinking alcohol. It seems unlikely that the former group could use exclusively avoidant strategies for any length of time. Instead, on the evidence of figure 16 and table 9, abstainers reduce their avoidance over time, whereas lapsers do not. It may be that by having little choice in confronting some cigarette cues, abstainers ration the amount of exposure that they undergo at the early stages of cessation, while craving is high and self-efficacy and AME, relatively low. If so, this is remarkably similar to the cue exposure treatment regimes recommended in the clinical literature (Heather and Greely, 1990). However, passive extinction paradigms in the treatment of drug use have not proved effective in the reduction of relapse rates (Drummond et al, 1995). It may be that varying exposure to smoking related stimuli, is one of the active coping skills which could prove an effective strategy in treatment, and this is consistent with Bliss et al (1989) who recommend that skill based interventions should encourage initial avoidance of smokers, but should also encourage participants to later develop active coping strategies. This was based on the finding that the presence of smokers was associated with relapse in the latter stages of follow-up, but not in the early vigilant regarding smoking cues initially but that this relaxed over time. From the current study it could be argued that to successfully maintain abstinence indefinitely, avoidance, and by implication, aversive coping, must eventually be eradicated.

#### **Implications for the RP model**

To return once again to the RP model, these findings suggest that coping with a high risk situation is much more complex than simply employing appropriate skills and deriving the benefit of increased self-efficacy. Instead the individual attempting abstinence may make a series of judgements as to their own coping skills, and therefore influence the amount of exposure they are willing to risk at any particular time. This is likely to be shaped by their own level of self-efficacy, motivation and craving. Similarly the perceived level of performance within the high risk situation in terms of craving, control and AME attributions will affect future estimations of skill level and self-efficacy, and subsequently

influence future exposure. Individuals who for whatever reason over rely on avoidance would seem less likely to achieve the increase in AME, and self-efficacy, of those who successfully cope using a greater degree of exposure. Aversive coping seems unlikely to be of any benefit, and may be extremely damaging. As Shiffman (1984a) suggests, there is more than one option open to participants who have a "close call". On the one hand they have survived the crisis and not smoked, but on the other they are reminded of their vulnerability.

Those participants who lapse are at even more risk of relapse. Not only does failure impair the development of the AME, it seems also to be associated with decreased self-efficacy and increased craving. Figure 17 shows the effect of the "valid" lapses exhibited by participants. Both AME and self-efficacy seem to suffer temporary reductions in the day after a lapse, which recover to previous levels over a week. The post-lapse effect on craving is the opposite, a substantial increase that again returns to previous levels within a week. From Table 10 it can be seen that only self-efficacy and craving exhibit statistically significant changes but this represents a small sample (n = 8) of lapsers. Also it should again be remembered that those individuals were retained in treatment and therefore may be exhibiting unrepresentative effects on these variables and this may explain the apparent recovery from individual lapses evident in figure 17. Data on relapsers may show even more marked lapse effects.

While the effect of a lapse was substantial in this subgroup, there was no evidence of prelapse drops in self-efficacy, or AME, and only a negligible increase in craving. This posthoc hypothesis stemmed from an idea put forward by RP theory, which suggests lapsers may, on some level at least, plan their lapse to the extent that they make seemingly Again, the possible bias in this group of lapsers may have precluded a positive result in this respect. Perhaps individuals who experience more turmoil in the lead up to a lapse, i.e. higher craving, lower AME, lower self-efficacy are in more danger of full-blown relapse. Certainly the different processes at work in relapse recovery and lapse relapse, which this study is of too small a scale to address, are worthy of further research.

A possible mediating factor here is subject affect. Several researchers have reported negative affect as obstacles to smoking cessation (Cohen 1986, Glasgow et al 1985). Participants with even mild depression have been shown to be more likely to fail at smoking cessation (Hall et al, 1985), although nicotine replacement has been shown to be effective with this group (Kinnunen et al, 1996). Affect regulation has also been shown to improve short-term maintenance in smoking cessation (Kamarck and Lichtenstein, 1988) in that participants with better affect regulation strategies also have better outcome. Since depressed individuals frequently attribute negative events to internal causes and positive events to external ones (Blackburn, 1987), they would seem to be more likely to experience a more powerful AVE in response to a lapse and similarly be less likely to develop an AME after coping events. As well as focussing on negative affect regulation with respect to its role in triggering lapse, and escalation into relapses, the implication of the current study is that coping responses should also be a focus of intervention with the aim of facilitating the AME.

Pre-existing attributional style may also have implications for responses to both lapse and coping situations in non-depressed participants. In an opiate using population, Bradley et al (1992) reported those with a relatively more internal attributional style for negative outcomes, were more likely to be abstinent at follow-up and to have contained the effects

outcomes, were more likely to be abstinent at follow-up and to have contained the effects of a lapse. While these findings would at first appear contrary to the predictions of the RP model, where internal attributions are integral to the proposed AVE, the authors argue that lapsing per se may not be perceived as a negative event. Perceptions of a lapse may be mediated by fluctuating goals e.g. controlled or occasional use, but also by perceived control. Addicted participants in the Bradley et al study had better outcome if they perceived they had more personal control, and personally more internal attributions for responsibility. While the Bradley et al (1992) study found no comparable predictive effects for pre-existing attributional style for positive outcomes, the study did not extend to measuring reactions to coping responses which would be of interest in the present context, where one might expect those with relatively greater internal attributions for positive outcomes to exhibit a greater AME, and again this represents an area for future research.

#### **Implications for RP Treatment**

Daley and Marlatt (1992) summarised the major themes in RP treatment. These are to help clients; identify high-risk situations, understand relapse as a process and as an event, understand and deal with cues and cravings including social pressure, and negative emotional states and to develop a supportive network and a balanced lifestyle. The emphasis here is on the early stages of cessation. Evidence of the AME provided by the current study suggests treatment should also focus on the maintenance stage. While the RP model implies a "balanced lifestyle" should decrease the intensity and frequency of high-risk situations, interventions which extend beyond basic treatment modules, have tended to repeat the content of previous sessions (Brownwell et al, 1986). Such "booster" sessions have failed to be demonstrated as effective (Brandon et al, 1987), although Mermelstein et al (1992) have criticised the latter study as lacking in statistical power. Similarly, Baer &

Marlatt (1991) argue that the processes involved in maintenance, e.g. support and selfefficacy are quite different from those in cessation.

Annis et al (1996) describe a five stage component counselling programme to match the five stages of Prochaska and Diclemente (1983) described earlier (Figure 1). Clients who progress beyond the initial three stages can join the individualised structured relapse prevention (SRP) programme. This constitutes two stages. Stage one involves an initiation phase where clients are required to outline problematic triggers to relapse. They are then taught to anticipate and deal with those over the next week. Interestingly the method differs from most related RP skill training in that the level of avoidance incorporated in participants' planned coping, begins relatively high and is gradually tapered to be replaced by more exposure to participants' high risk situations in the second SRP phase. In addition, this latter stage incorporates fading of pharmacological agents, and individually tailored homework assignments to promote internal and control attributions. The findings of the current study are consistent with the contents of the programme in that the abstinent subgroup gradually reduced their avoidant coping on their own (Figure 16, Table 9). Also if participants' AME was regularly assessed it may provide relevant information as to the success of attempts at reattributional training described above, perhaps to the extent of allowing the targeting of more intensive input to those slowly developing AME in response to coping, and signalling the tapering of treatment with those achieving high AMEs more quickly. In effect the concept of the AME may also broaden the Prochaska and Diclemente model in that maintenance may involve two stages, low AME and high AME, instead of only one. This notion of different stages of maintenance is also consistent with recent work with alcoholics by Amodeo and Kurtz (1998), who suggest that as periods of abstinence become longer, coping becomes less conscious and more automatic.

Annis et al (1996) also describe a new method of assessing the client's stage of change, the commitment to change algorithm. This is based on recent use, reported intention to change, and recent change attempts. The maintenance stage requires clients to be continually abstinent for at least 60 days. Calculation of AME scores could be incorporated into this algorithm to provide valuable information as to the client's stage of maintenance.

Again this type of stage model can be criticised in that in the experience of many clinicians, addicted clients do not always proceed sequentially through each phase of the model. Similarly, the type of high risk situation encountered, may be as important as the maintenance stage the client has reached, in determining the type of coping response employed (Marlatt, 1996), e.g. a client who has not avoided any situations for months may not wish to make a visit to their home town where their old drug-using friends are.

However, as stated above, ex-smokers may be less likely to maintain abstinence using avoidant strategies due to the prevalence of cigarette cues in their daily environment, and consequently the smoking field could provide a useful client group with which to test the Annis et al (1996) treatment model, and the concept of the AME may prove a useful extension to it.

### **Methodological Problems**

As discussed above, problems common to studies investigating the AVE, or uniquely in this case, the AME, are deciding the constituent elements of the attributional constructs, and finding a method of measurement which has a meaningful and valid impact on participants. Regarding the former, Shiffman et al (1997a) is particularly critical of such abstract attributional measures, although the authors do not suggest a viable alternative. Indeed it is difficult to see how attributions could be otherwise measured apart from the independent rater method employed by Bradley et al (1992), and this has potentially more methodological problems inherent in it as well as being difficult to adapt to a repeated measurement design. In the interests of comparability of studies a desirable step forward would be to attempt standardisation of attributional measures. Alternatively, each subject cohort could be piloted in an attempt to discover the AVE/AME constituents which are especially relevant to them. It may be that participants differ in the extent to which different constituent parts (i.e. internality, stability, globality, controllability) of the constructs are more likely to influence future behaviour; e.g. one subject may be concerned that their ability to resist smoking may decline in the future when they have less support (stability), another may feel they are not the type of person who generally succeeds (globality). If so, this has implications for any reattributional training which may be attempted. It also seems likely that individual affect could interact with AVE/AME and the current study did not include any measures to control for this.

Regarding the latter problem of instrument design, ten point scales appear more sensitive to change than the four point items included in some studies (including the current pilot stage) and seem less likely to encourage rote responses. Also, Shiffman et al (1997a) introduced a methodology which represents a promising (if expensive) improvement in design of studies of this type, if the end point of a high risk situation can be effectively established. For studies with less resources the diary log incorporated in the present design offers a cheaper if less sophisticated alternative.

### **Conclusions**

Only three published studies have attempted to directly measure the attributional effect of tempting or close call coping situations on participants attempting abstinence (Walton et al, 1994; Schmitz et al, 1993; Shiffman et al, 1997a). Of these, only the latter two used smokers attempting cessation as a source for their sample, and only Shiffman et al (1997a) incorporated a design where participants' attributions were measured on frequently administered repeated measures.

The current study used a specially designed diary log to test several hypotheses relating to the attributional consequences of coping situations, where newly abstinent smokers were at a high risk of lapsing. Results tended to support the idea that an Abstinence Maintenance Effect (AME) exists after coping where participants make internal, stable and global attributions regarding their coping behaviour. This effect is analogous to the AVE suggested by Marlatt and Gordon (1985) which is thought to occur in response to lapses. The AME was also similar to the AVE in that it increased in power over time spent abstinent, while its development seemed to be retarded by lapses. While hypotheses regarding the positive correlation of AME and self-efficacy, and the negative correlation with craving, were not supported by the data, all three variables exhibited a relationship with treatment outcome. Similarly, avoidant coping was not shown to be negatively correlated with the AME, but again differences in lapsers and abstainers performance on this variable were evident.

Finally, the treatment implications of the existence of the AME were discussed with particular reference to those directed at improving the maintenance of abstinence.

## **APPENDIX I**

## **STOP SMOKING DIARY**

## PILOT STUDY

### **STOP SMOKING DIARY**

Please fill in this diary for the next 7 days.

There are two pages for each day. You will find it easier to fill in these on the actual day you are recording.

The first page asks you to estimate the number of cigarettes you smoked on that day, the number of times you felt like smoking, number of situations avoided and to list any other strategies that you may use.

The second page asks you to answer questions about one particular occasion where you smoked (if any).

(If you did not smoke leave this blank. If you smoked on more than one occasion pick the one where you smoked your first cigarette of the day).

Finally, you are asked about one situation when you wanted to smoke but didn't. (If there are several of these in the day pick the one where you wanted to smoke the most).

### PILOT STUDY STOP SMOKING DIARY

### LIKERT ITEMS RATED ON 4-POINT SCALE

AGREE	AGREE	DISAGREE	DISAGREE
STRONGLY	SLIGHTLY	SLIGHTLY	STRONGLY

- □ The reason I smoked (did not smoke) in the situation will always be present in similar future situations [STABLE]
- □ I was totally in control over the decision to smoke (not smoke) in the situation. [CONTROL]
- □ Smoking (not smoking) in this situation has increased my confidence in giving up cigarettes [SELF EFFICACY]
- □ The reason I smoked (did not smoke) also affects other areas of my life other than smoking [GLOBAL]
- □ The reason I smoked (did not smoke) was entirely due to me [INTERNAL]

### **TEN POINT RATING SCALES:**

- □ How much did you feel like smoking in this situation? [CRAVING] (0 = nothing at all  $\rightarrow$  10 = very much indeed)
- □ How confident do you feel about giving up smoking for good **right now**?[SELF EFFICACY]  $(0 = \text{nothing at all confident} \rightarrow 10 = \text{extremely confident})$

# **APPENDIX II**

## **STOP SMOKING DIARY**

# MAIN STUDY

# Notes on filling in Stop Smoking Diary

The diary is a crucial part of the research that we are doing so please remember to fill it in carefully - it is designed to be done at the end of each day, beginning on a Monday and ending the following Monday when you are asked to fill in the last page before handing it in on entering the Monday group - when your smokalyser score will be entered on it.

When you open the diary you will see there is a double page for each day of the week. You are first asked about nicotine replacement and then about smoking. If you have smoked on the first day you fill in the diary, then you should fill in the coloured middle page. There is only one of these coloured pages in each weekly diary so if you smoke on another day in the same week there is nothing to fill in except the first two questions about nicotine replacement and smoking.

If you have not smoked during a particular day you are asked to answer six questions about how you feel about this by putting one X on each of six scales. See overleaf.

Each scale is divided into 10 segments:



Finally, please remember to read each question carefully - they <u>are not</u> in the same order each time.

## STOP SMOKING DIARY: MAIN STUDY

### LIKERT ITEMS RATED ON A 10-POINT SCALE

[AVOIDANCE]	How much did you avoid situations today because you might be tempted to smoke?	(Not at all/A great deal)
[CRAVING]	How much did you feel like smoking today?	(Not at all/A great deal)
[SELF EFFICACY]	How confident do you feel right now about giving up smoking completely?	(Not at all confident/Extremely confident)
[INTERNAL]	Do you feel the fact that you smoked (did not smoke) today is completely down to yourself?	(Completely down to me/Not at all down to me)
[GLOBAL]	Do you feel the fact that you managed not to smoke (did smoke) today says something about you as a person?	(Does not say anything/Does say something)
[STABLE]	Do you feel the things that stopped (started) you smoking will nearly always be around?	(Hardly ever around/Nearly always around)

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