A Randomised Controlled Study of the Relative Efficacy and Mechanisms of Action of Cognitive-behavioural Coping Skills Training (CBST) and Acceptance and Commitment Therapy (ACT) for Smoking Abstinence

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January, 2013

AUTHOR'S DECLARATION

This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.

Signed:

Date:

ACKNOWLEDGEMENTS

All my thanks go to my Mum, Dad, Sister, Gran and Granda. You know I love you all.

I cannot give enough thanks to John and Madeleine for what you have done for me over the past five years. You have been the epitome of inspiration and guidance. I always felt like you had my back. Simply, without you, I would not be where I am.

Thanks to Jack for being a great friend and research partner over the past five years. Thanks for allowing me to pester you with my thoughts daily, bounce ideas around, and debate the days away.

Thanks to all the participants and people who made this piece of research possible and a pleasure to conduct.

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ABSTRACT

Cognitive-behavioural Coping Skills Training (CBST) and Acceptance and Commitment Therapy (ACT) both conceptualise smoking relapse as prototypically motivated by a desire to avoid negative affect and associated cognitions and environments. However, they specify contrasting techniques for increasing smokers' abilities to forgo the powerful negative reinforcement of affect reduction that is available through smoking. Whereas CBST focuses on developing smokers' skills for avoiding and coping with negative affect, ACT aims to reduce smokers' avoidance of cues to negative affect instead foster' their willingness to fully experience these cues. A separate line of research suggests that individual differences in smokers' tendencies to suffer paradoxical effects of experiential avoidance may be an important determinant of CBST's therapeutic impact. This study compared the efficacy of group CBST (n = 37) and ACT (n = 42) for long-term smoking abstinence in motivated-to-quit, nicotine-dependent smokers, and examined mediation of abstinence outcomes by each models' putative mechanisms of action. Moderation of abstinence outcomes by participants' paradoxical behaviour tendencies, as measured on four computer tasks prior to random assignment to CBST or ACT, was also examined. Efficacy analyses showed that CBST and ACT produced high and statistically equivalent rates of past 30-day abstinence at three month follow-up (37% vs. 52%). However at six month follow-up, ACT participants were 3.47 times more likely to report no smoking in the past 30 days, when controlling for other possible explanatory variables (15% vs. 39%). In support of the ACT model, 30-day abstinence outcomes following ACT were mediated by reductions in avoidance of internal smoking cues. In contrast, CBST outcomes were neither mediated by increased use of coping strategies, nor moderated by paradoxical behaviour tendencies. Overall, results suggest that

rationalising and training acceptance-based responding to smoking cues may provide an efficient alternative to traditional cognitive-behavioural interventions in the treatment of nicotine dependence.

CHAPTER ONE: OVERVIEW OF THE SMOKING PROBLEM

1.1. INTRODUCTION

Tobacco smoking as a mass killer has been described as a phenomenon of the 20th century, and remains the largest preventable cause of illness and premature death worldwide today. The carbon monoxide, tar, and more than 69 carcinogens in cigarette smoke are reported to kill over 120,000 people in the U.K. each year – more than thirteen people an hour – with more than 30 people dying from smoking-related diseases in Scotland each day (Callum, 1998). One in five deaths in the U.K. at all ages are attributed to smoking, and those who smoke regularly lose sixteen years on average from their life expectancy compared to non-smokers (Peto, Lopez, Boreham, Thun et al., 1994). Smoking is also believed to cause approximately 46,500 deaths from cancer per year in the U.K. – three out of ten cancer deaths. Eighty-four per cent of deaths from lung cancer, and 83% of deaths from chronic obstructive lung disease, including bronchitis, are attributed to smoking. Smoking can also cause death by cancer of the mouth, larynx, oesophagus, bladder, kidney, cervix, stomach, and pancreas.

The rationale for the WHO's (2004) *European Strategy for Smoking Cessation* is guided by data which show that the vast majority of projected deaths caused by smoking in the next 25 years will be among *current smokers* who continue to smoke. Thus, the number of smoking-related deaths will rise if no adults quit or if there is solely a reduction in young adults taking up smoking. Health experts are therefore in universal agreement that increasing smoking cessation in adults is the single most important action that can be taken to decrease

smoking deaths and improve public health in the short to medium term. Given the significance and prevalence of smoking, the WHO (2004) states that a range of efficacious treatment options should be made available to individuals who are motivated to quit, and that individuals who do not yet wish to quit should be encouraged and assisted to do so as soon as possible.

1.2. QUIT RATIOS WITHIN GENERAL AND UNASSISTED POPULATIONS

Since the publication of the *Smoking Kills* White Paper on tobacco (Department of Health, 1998), prevalence of cigarette/hand-rolling tobacco smoking in the United Kingdom has decreased from 28% of all adults (16+) in 1998 to 21% in 2009 (Lader, 2009; Tobacco Manufacturers' Association, 2008). This equates to around 10.6 million current smokers – 1.6 million in Scotland. A national survey of UK smokers found that a desire to quit is indicated by 72% of current smokers; approximately 58% make at least one attempt to quit smoking in a given year, and 22% make three or more attempts each year (Taylor, Lader, Bryant, Keyse, et al., 2006). However, the number of individuals who achieve long-term abstinence remains disappointingly low; 71% of smokers who have tried to quit report that their last quit attempt lasted less than 6 months. Within the general smoking population, a UK survey of 4512 smokers between 1999 and 2005 who said they had made at least one quit attempt in the past five years found that fewer than 9% had managed to abstain completely for two years or more (Taylor et al., 2006).

A number of efficacious treatment options are available to assist people with smoking cessation. However, despite their ready accessibility and low cost relative to tobacco

products, the public health benefit of these options has been limited because the vast majority (91-95%) of smokers who decide to quit then do so on their own, without the help of a formal treatment (based on $N > 5000$, Cohen et al., 1989). However, only a small percentage of unassisted quitters remain abstinent up to 12 months later (0.5 to 5%), even in Western countries where tobacco control policies are well advanced, tobacco taxation is extremely high, and the health consequences of smoking are extensively advertised and relatively well understood (Royal College of Physicians, 2000). In a study of the rate of uptake of assistance during quitting, Zhu et al. (2000) found that while only a minority (19.9%) of quitters used one or more method of assistance (self-help, counselling, and/or nicotine replacement therapy (NRT)), one-year abstinence rates were significantly higher (15.2%) among assisted quitters than among the 80% of smokers who tried to quit without assistance (7%). Using the percentage of smokers that manage to quit on their own as a rough baseline against which the efficacy of formal cessation interventions can be evaluated, it appears the use of assistance is associated with a greater success rate. It is unclear, however, whether the success ratio favouring assisted quitters is due to the ability of the cessation interventions to initiate abstinence and prevent relapse – the resumption of regular smoking (Hughes, Keely, Niaura, Ossip-Klein et al., 2003) – or the inability of unassisted quitters to go about quitting in an efficacious way.

CHAPTER TWO: COPING WITH URGES TO SMOKE

2.1. EXPERIENTIAL AVOIDANCE OR ACCEPTANCE?

According to Wegner (1997), the nature of mental control dictates that there are ultimately only two states of mind to which we can aspire: to have something in mind or to not have something in mind. If a person is not actively trying to bring a thought into mind or push a thought out of mind, there is little else he/she can do with it. Normally, a person can only concentrate on a single thought at a time, but in deciding the thought on which to concentrate, the person must engage and evaluate all other thoughts as material to be suppressed to allow concentration on the wanted thought. Concentration and suppression are two sides of the same coin; a person's ability to concentrate on thought 'A' is inversely related to his/her ability to suppress all thoughts that are not thought 'A' in that, though he/she can only be conscious of doing one of these processes, it is not possible to move attention toward one thought without at the same time moving it away from another thought. Therefore, primary suppression of thought 'A' is followed by auxiliary concentration on thoughts that are not thought 'A', and vice versa, primary concentration on thought A is followed by auxiliary suppression of thoughts that are not thought A. Any mental operation of which we are capable functions ultimately to aid primary concentration/auxiliary suppression or primary suppression/auxiliary concentration.

The primary and auxiliary forms of concentration and suppression are used according to whether it is more important that a person has a thought or avoids a thought. Primary suppression is used when it is most important that a person keeps a particular thought out of mind, whereas auxiliary suppression is used to direct one's attention away from something so as to allow the person to concentrate on something else. Primary concentration is used when it is most important that a person keeps something in mind, whereas auxiliary concentration is used when one wishes to attend to something so as to suppress attention to something else (i.e. when one seeks distraction). In other words, primary concentration is used to maintain a

line of thought, whereas primary suppression is used to reject a line of thought. An individual's tendency to use primary suppression or primary concentration in any given situation therefore says much about what he is trying to achieve, what he believes is stopping him from achieving this, and what he believes must happen in order to achieve his goal.

In most circumstances, people give greater effort to concentrating on something and suppressing something else as a means to aid concentration. Getting to work in the morning requires us to concentrate on having a shower, making breakfast, putting our shoes on the correct feet, and finding the car keys etc. In the evening we prepare dinner by concentrating on buying ingredients, setting the oven, and preparing dishes and utensils, while suppressing the thoughts which would pull our attention away from doing these tasks well. The primary goal of mental control in normal circumstances is to fill our minds with task-relevant thoughts and suppress task-irrelevant thoughts as means to aid concentration on task-relevant thoughts. However, for people who are most concerned with avoiding or escaping a current line of thought, primarily as a means to avoid or escape a current line of behaviour, suppression becomes the primary mode of control. Unlike primary concentration, primary suppression is motivated by a desire to have an absence of a particular mental or emotional state. There are many things in life we may prefer to not think, say, feel, or do, and there may be particular times and places in which we conclude that, now more than most other times, it would be better for us to act swiftly and precipitously to circumvent and cut short our experience of an unwanted thought, emotion, or overt behaviour.

2.2. THE UBIQUITY OF AVOIDANCE COPING STRATEGIES AMONG QUITTING SMOKERS

Coping actions (cognitions and behaviours) that function to avoid, escape, suppress, reduce, eliminate and otherwise control the frequency and form of unwanted private events (cognitions, emotions, and bodily sensation) are collectively defined in the coping styles and clinical process literature as *experiential avoidance*, a phenomenon which "occurs when a person is unwilling to remain in contact with particular private experiences… and takes steps to alter the frequency of these events and the contexts that occasion them, even when doing so creates harm" (Hayes, 2004: 14). Experiential avoidance can be exercised in a variety of private and public ways. As a first line of defence against unwanted thoughts, thought suppression is the mental strategy that people default to when a thought must not be entertained, an action must not be performed, an emotion must not be experienced, and an idea must not be communicated (Wegner, 1994a). Psychoactive drug use, distraction, relaxation, behavioural avoidance, physical prevention, thought suppression, dissociation, ignorance, intentional forgetting, downplaying, repression, and refusing to talk about problems can all be viewed as acts of experiential avoidance because they all aim to alter the frequency and form of the private experiences which one would rather not have.

Smoking-related thoughts and mental images have been shown to occur very frequently and intensely in people currently attempting to give up or cut down smoking, and these people report making active and specific efforts to suppress smoking-related thoughts as part of their quit attempt (Salkovskis & Reynolds, 1994). Toll, Sobell, Wagner, and Sobell (2001) found that current quitting smokers self-reported a significantly higher tendency to suppress smoking thoughts than did ex-smokers, suggesting there is something special about the abstinence experience that promotes thought suppression as a preferable coping strategy. In a retrospective analysis of the relationship between coping style and smoking outcome,

Haaga and Allison (1994), too, found that the strategies used by 91 ex-smokers to cope with strong urges to smoke could be fit to either of two broad categories: cognitive restructuring (e.g. thinking about the health benefits of quitting) or thought suppression.

In an initial evaluation of the Ways of Quitting (WoQ) questionnaire, Myers, MacPherson, Jones, and Aarons (2007) surveyed 88 adolescent (aged 14 to 19), US high school-attending, current smokers on the strategies they had used to quit smoking in the past and the helpfulness of these strategies. The most commonly used strategies were those which involved avoidance, distraction, and a reduction of smoking. In the avoidance category, smokers reported having tried to not carry cigarettes around with them (81.8%), to avoid people who smoke (58.0%), to not buy cigarettes (79.5%), and to avoid places where they usually smoke (48.9%). In the distraction category, smokers reported having tried to keep themselves occupied by doing other things (81.8%), to do things to keep their mouth busy (76.1%), to do things to keep their hands busy (54.5%), and to not think about smoking/to think about something else (77.3%). In comparison, few smokers had sought help from a stop smoking website (5.7%), a stop smoking class or group (8.0%), a stop smoking telephone helpline (6.8%), or had used a nicotine replacement patch or gum (11.4%) or other smoking cessation product (8.0%). Interestingly, the avoidance-oriented strategies of not carrying cigarettes around and avoiding people who smoke were rated as the most helpful of all reported strategies (mean scores of 3.58 and 3.37 out of 5.00 respectively). By contrast, avoiding places where they usually smoke and suppressing smoking thoughts were rated as considerably less helpful (mean scores of 2.58 and 2.63 out of 5.00 respectively). Overall, evidence suggests that smokers overwhelmingly tend to try to avoid and escape smoking-related thoughts and feelings as part of their attempts to quit smoking.

CHAPTER THREE: NEGATIVE REINFORCEMENT THEORIES OF SMOKING RELAPSE

3.1. OVERVIEW

Despite the intuitive appeal of avoiding smoking cues as part of a plan to quit smoking, it is a well-established behavioural principle of early operant conditioning studies (e.g. Skinner, 1938) through to contemporary reinstatement/re-activation models of drug motivation (see Shaham, Shalev, Lu, de Wit, & Stewart (2003) for a review)) that the immediate benefits of avoiding unpleasant private experiences can provide powerful negative reinforcement for maladaptive behaviour, such as smoking to alleviate the adverse effects of nicotine withdrawal. Learning theories of drug motivation (e.g. Wikler, 1948) have long identified negative reinforcement as the key learning process accounting for why people relapse to drug use after a significant period of drug abstinence. The central hypothesis of these theories, in one form or another, has been that an individual's desire to avoid or escape the adverse drug withdrawal syndrome which reliably accompanies the decline in drug levels in the brain and body is the prepotent motive for a reinstatement of drug use – defined as "the resumption of a previously drug-reinforced behaviour by non-contingent exposure to drug or non-drug stimuli after extinction" (Shaham et al., 2003: 5) – in addicted individuals (Solomon, 1977; Wikler, 1980; Goldman, Brown, & Christiansen, 1987; Wetter, Smith, Kenford, Jorenby et al., 1994; Everitt & Robbins, 2000; Mueller & Stewart, 2000; Koob & Le Moal, 2001; Epstein, Preston, Stewart, & Shaham, 2006).

Recently, the focus of negative reinforcement theories has shifted away from the physiologic effects of drug withdrawal to emphasise a reduction of negative affect as the prepotent motive for a drug relapse. The fundamental hypothesis of these reformulated negative reinforcement theories is that "addicted drug users sustain their drug use largely to manage their misery" (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004: 34). This hypothesis is borne from data which suggest that (i) levels of negative affect reliably predict the severity of a drug withdrawal experience; (ii) reinstatement of drug use commonly occurs in affective situations, and (iii) negative affect is rapidly and efficiently alleviated by this reinstatement of drug use.

Baker et al.'s (2004) negative reinforcement model argues that learning to respond to interoceptive signals to negative affect with smoking is the crucial formative experience for nicotine addiction. The authors suggest that the contingencies between (i) drug declines in the body and the emergence of an adverse withdrawal syndrome, and (ii) drug reinstatement and a rapid reduction of negative affect are ideal conditions for learning to respond to pharmacologic sources of negative affect with smoking and other behaviours that are closely linked with reductions of negative affect. The authors propose 'signalled avoidance learning' as the core motivational process accounting for addictive smoking. In the typical signalled avoidance learning paradigm, an organism is presented with a signal (a conditioned stimulus, CS) that is followed by repeated shocks or some other adverse stimulus (an unconditioned stimulus, US) until the organism shows an avoidance response to the CS. In the context of nicotine addiction, the CS would be decreasing levels of nicotine in the body, the US would be negative affect or other adverse internal effects of falling nicotine levels, and the avoidance response would be nicotine self-administration. A wealth of evidence from the signalled avoidance paradigm suggests that significant, rapid reductions in the US provide

feedback for the continuation of the avoidance response to the CS. The following sections describe the classical and operant conditioning processes which establish smoking as an avoidance response to signals of the emergence of nicotine- and stressor-induced negative affect.

3.2. THE PHARMACOLOGY OF NICOTINE: THE CONDITIONED STIMULUS

Nicotine reaches the brain approximately 13-secs after cigarette inhalation and is completely cleared from the brain in a single circulatory passage (Ochoa, 1994; Benowitz Jacob, Fong, & Gupta, 1994). By regulating the number, duration, and length (in seconds) of cigarette puffs, the smoker regulates nicotine delivery to the brain (Benowitz, 1988, 1990). Nicotine diffuses rapidly into brain tissue where it binds to nicotinic acetylcholine receptors (nAChRs) that coincide with the sites to which acetylcholine neurotransmitters bind (Martino-Barrows & Keller, 1987). The brain responds to this binding by increasing neurotransmission within specific dopaminergic pathways. Of particular importance are ventral tegmental dopaminergic neurons of the *substantia nigris pars compacta* (a portion of the midbrain) which connect with the frontal cortex and the limbic system via the mesocorticolimbic system (Ochoa, 1994), and the release of dopamine in the shell of the nucleus accumbens and striatal and limbic zones, which are associated with feelings of pleasure and euphoria, drug-induced reward, and increased locomotor activity (Pert & Clarke, 1987; Wonnacott et al., 1990). Activation of nicotinic cholinergic receptors also promotes the release of several other neurotransmitters which have behaviourally-reinforcing effects, including norepinepherine (arousal, appetite suppression), serotonin (mood regulation), γ-aminobutyric acid (GABA; reduction of anxiety and skeletal muscle tension), acetylcholine

(enhanced alertness, concentration, and cognitive function), and glutamate (enhanced memory retention and learning ability) (Benowitz, 1999, 2008). These behaviourally-reinforcing effects are experienced almost immediately after cigarette inhalation.

3.3. Negative Affect and Other Withdrawal Discomfort: The Unconditioned Stimulus

Nicotine has a distributional half-life of approximately 15-mins (Benowitz, 1996), and a terminal half-life in blood of nearly 2-hours (Benowitz, Jacob, Jones, & Rosenberg, 1982). Abrupt cessation of nicotine administration causes blood and tissue concentrations of nicotine to decline, and the release of dopamine and other stimulatory neurotransmitters in the brain recedes to a below-normal level, inducing a state of malaise and decreasing the individual's ability to experience pleasure. Most studies suggest that nicotine withdrawal symptoms emerge within six to twelve hours of cessation or a significant reduction in smoking, increase steadily and peak within one week, and decline to pre-cessation levels within approximately four weeks (Gilbert, McClernon, Rabinovich, Plath, & Masson, 2002), however, craving and hunger can remain elevated for up to one year post-quit (Hughes, 1992). Approximately 50% of smokers who quit without pharmacological assistance experience nicotine withdrawal (American Psychological Association, 2000), with estimates ranging from 21% (Hughes, Gust, & Pechacek, 1987) to 78% (Hughes & Hatsukami, 1986). Withdrawal symptoms may be reported even when nicotine levels in the brain and body are quite high, so long as they have declined from a higher level, meaning that a nicotine dependent individual may experience several bouts of nicotine-induced negative affect each day despite having high levels of nicotine in the body.

A basic property of the affective consequences of nicotine deprivation is that the duration of nicotine deprivation appears to be roughly linearly related to the intensity of affective distress, at least over the first minutes, hours, and days of withdrawal. Jarvik, Madsen, Olmstead, Iwamoto-Schaap et al. (2000), for example, found a tight temporal association between increasing self-reported nicotine craving and decreasing blood levels of nicotine. That is, the peaks and troughs of smokers' negative affect were entrained to the rise and fall of nicotine levels in the brain and body, at least in the first few days post-quit. Thus, to the extent that the discontinuation of nicotine consumption produces an elevation in negative affect, a resumption of nicotine self-administration appears to rapidly and reliably alleviate nicotine-induced negative affect and other somatic symptoms, but it does not produce an absence of affective or somatic symptoms (Wikler, 1980; Zinser et al., 1992; Parrott, 1999). Exposure to negative affect arising from non-pharmacologic sources (stressful stimuli, e.g. work stress, arguments, time pressure) has also been found to increase motivation to smoke (e.g. Drobes & Tiffany, 1997). Interoceptive and exteroceptive cues to negative affect serve just as well as one another to cue smoking because smoking alleviates nonpharmacologic stress as fully as it relieves nicotine-induced stress and because nicotine dependent individuals do not distinguish between nicotine- and stressor-induced negative affect.

3.4. SMOKING: THE AVOIDANCE RESPONSE

As nicotine levels decline in the brain and body, the resulting increases in negative affect enhance the salience of behaviours which have rapidly and efficiently alleviated

negative affect in the past (i.e. smoking). Under high levels of negative affect, this response-biasing effect toward well-learned, affect-ameliorating behavioural responses is so strong that adaptive responses based on controlled cognitive processing and declarative knowledge no longer compete. The result is that the strong motivational basis for avoiding negative affect shifts the individual's smoking motivation from pursuing the longer-term, positive reinforcing effects of smoking cessation (e.g. physical health, financial savings, and better social relations) to pursuing the powerful and immediate negative reinforcement of reductions of negative affect available through smoking.

Additionally, the individual begins to rationalise the resumption of smoking as a necessary action to reduce the negative affect which would otherwise undermine his ability to function effectively at work, at home etc. In effect, because the CS (declining nicotine levels) has itself become adverse by eliciting the adverse US (negative affect) the individual becomes motivated to show the operant avoidance response (smoking) in anticipation of the CS. The immediate, positive sensations of direct nicotine actions (e.g. restored feelings of calm, eased tension) serve as feedback that smoking was efficacious in reducing negative affect, which in turn reinforces smoking as efficacious avoidance response in that it produces a period of reduced negative affect. This learned contingency provides a powerful motivational basis for future responding with smoking to pharmacological stressors. Addicted individuals also gradually learn to respond to negative affect which arises from non-pharmacologic sources (e.g. work demands, arguments) with behaviours that are indicative of drug withdrawal avoidance motivation. However, though bouts of drug withdrawal can rapidly become associated with external events and environments, Baker et al. (2004) suggest that the interoceptive cues which become CSs for drug urges surpass these external associations in terms of drug motivation because they signal negative affect, i.e. interoceptive

CSs for drug use which arise from external sources are more potent determinants of drug use than are external CSs themselves.

The main consequence of the increased salience of operants which yield optimal relief from negative affect and drug craving, however, is a decrease in the salience of the impact of operants which have long-term positive reinforcing effects but which yield only minimal relief from adverse experiences in the short-term. As a consequence, less well-practiced, more effortful, adaptive long-term operants become devalued, leaving the addicted individual dependent on an impoverished repertoire of attractive but often maladaptive operants for coping with drug CSs. In other words, the pleasant effects of smoking reinforce the smoker to *not* reflect upon response options that are less tightly linked with the reduction of negative affect. This means that smoking will likely remain the dominant response mode to negative affect because alternative modes of responding have received little reinforcement.

3.5. Extinction of the Avoidance Response

Once established as a signalled avoidance response to declining nicotine levels, smoking becomes highly resistant to extinction. Even negative long-term effects of smoking (e.g. decline in physical health) do not appear to be efficacious for discouraging smoking to alleviate negative affect in the short-term. Additionally, in contrast to the expectation that punishment of such an avoidance behaviour may lead to its extinction, an extensive literature shows that punishment of avoidance behaviour actually has the paradoxical effect of strengthening, not weakening avoidance behaviour. This is presumably because punishing avoidance behaviour elicits more negative affect which, in turn, prompts the over-learned

avoidance behaviour, and so on in a vicious cycle. Thus, smoking is difficult to extinguish as coping method because the negatively reinforcing effects of smoking are typically powerful and well-learned, which tends to produce an incentive value for continuing to smoke which is far greater than the incentive value for foregoing the immediate benefits of smoking in order to pursue valued long-term consequences of quitting smoking.

Not only is avoidance behaviour difficult to extinguish but it can also be rapidly and fairly effortlessly reinstated following a period of extinction which had lasted up to many years. This reinstatement usually occurs in response to renewed exposure to negative affect elicited by subtle changes in the individual's environment (Bouton, 2000). Even if an individual has since learned more adaptive cognitive and behavioural responses to negative affect, subtle environmental changes (e.g. having an argument, work piling up) can be sufficient to renew the incentive value of smoking and trigger a relapse.

3.6. Evidence for a Reduction of Negative Affect as the Prepotent Motive in Addictive Smoking

A great deal of correlational and cross-sectional evidence supports the prominent motivational role for the avoidance of negative affect in smoking initiation, progression to regular use, and relapse. Trait/individual difference theories of relapse vulnerability suggest that drug users and relapsers are characterised by a tendency to experience more frequent and severe bouts of negative affect than individuals who never use drugs and individuals who manage to sustain abstinence for longer periods (Irvin & Brandon, 2000; Irvin, Hendricks, & Brandon, 2003; Brandon, Vidrine, & Litvin, 2007), and suggest that people with histories of

affective problems may begin experimenting with smoking as a way of reducing their high levels of negative affect to more tolerable levels. In support of trait theories of smoking, individuals who experience traumatic life events such as childhood abuse and parental divorce (Anda et al., 1999) and individuals who acquire depressive and anxiety disorders (Dierker, Avenevoli, Merikangas, Flaherty et al., 2001) are more likely to start smoking, and significantly higher incidences of depression and some anxiety disorders are found among current smokers than non-smokers (Zvolensky, Feldner, Leen-Feldner, & McLeish, 2005).

Higher rates of smoking prevalence and lower quit rates have also been found among individuals with depression (Pratt & Brody, 2010), affective disorders, and histories of traumatic events (Polusny & Follette, 1995) relative to individuals not diagnosed with these disorders. For example, a recent US Household Survey found that adults aged 20 + with depression were more likely to be cigarette smokers than those without depression; that the proportion of smokers increased as depression severity increased; and that depressed smokers were less likely to quit than non-depressed smokers (Pratt & Brody, 2010).

Several prospective studies, too, have found that a history of depression (Anda, Croft, Felitti, Nordenberg, Giles et al, 1999; Ford, Anda, Edwards, Perry et al., 2011), severity of affective distress at the beginning of treatment (Kinnunen, Doherty, Militello, & Garvey, 1996), and at post-treatment (Covey, Glassman, & Stetner, 1990; Ginsberg, Hall, Reus, & Munoz, 1995) have been found to be accurate indices of relapse vulnerability up to 12 months post-treatment. Patton, Hibbert, Rosier, Carlin et al. (1996) found that after controlling for academic level, sex, alcohol use and parental smoking, adolescents with high anxiety and depressive symptoms were twice as likely to be smokers. In a later prospective study of smoking initiation in adolescents, Patton, Carlin, Coffey, Wolfe et al. (1998) found that anxiety and depressive symptoms, when experienced in the presence of peer smoking,

together predicted the initiation of experimental smoking and increased the likelihood of transitioning to regular daily smoking.

Quitting smokers who have a lower threshold for tolerating unavoidable distress on laboratory tasks have been shown to relapse to smoking quicker than quitters who demonstrate a high level of distress tolerance (Brown, Lejeuz, Kahler, Strong et al., 2005). Within smokers too, positive associations have been found between smokers' duration of breath-holding, a measure of tolerance for physical discomfort, and duration of continuous abstinence from smoking post-quit (Hajek, Belcher, & Stapleton, 1987; Brown, Lejuez, Kahler, & Strong, 2002). Smokers who have high anxiety sensitivity (a propensity to experience fear in response to interoceptive sensations) have been shown to more rigidly rely on smoking as a means to temporarily escape distressing interoceptive cues (Kassel & Shiffman, 1997) and report being more troubled by negative affect during quitting (Zvolensky, Lejuez, Kahler, & Brown, 2004) compared to smokers with low anxiety sensitivity. Brown, Kahler, Zvolensky, Lejuez et al. (2001), for example, found that levels of anxiety sensitivity reported by 60 smokers with a past diagnosis of major depressive disorder (MDD) were positively associated with self-reported negative reinfoircement smoking motives (i.e. smoking to reduce negative affect), and that being high on anxiety sensitivity increased quitters' risk of lapsing to smoking within the first seven days post-quit. Lastly, higher rates of smoking prevalence and lower quit rates tend to be found among individuals with depression (Pratt & Brody, 2010), anxiety disorders (Morrisette, Tull, Gulliver, Kamholz, & Zimering, 2007), and histories of traumatic events (Polunsy & Follette, 1995) compared to the non-affected individuals. Given the learned potency of tobacco smoking to temporarily alleviate negative affect, it is unsurprising that the motivational value of smoking

is highest for individuals suffering from high levels of trait affective distress as they attempt to reduce their affective distress to more tolerable levels.

Following a period of abstinence, smoking tends to be reinstated in the context of negative affect and stress. Abstinent and current quitting smokers have retrospectively reported that a number of past relapse episodes occurred in response to situational increases in negative affective states (anger, anxiety, frustration, worry, and depression), and that the decision to resume smoking was motivated by their desire to relieve bouts of negative affect (Marlatt & Gordon, 1985; Shiffman, 1982; Brandon, Tiffany, Obremski, & Baker, 1990). A recent U.K survey of smokers who had tried to quit found that the most commonly reported reason for starting smoking again was because "life was too stressful/just not a good time" (38%: Lader, 2009). In an early examination of common antecedents to relapse in ex-smokers who called a relapse counselling telephone hotline, approimately one-third of abstinent smokers reported that negative affect (anger, anxiety, and depression) elicited a strong urge to smoke (Shiffman, 1982). In a later study, 'bad mood' and stress were found to precede more than one-third of relapse episodes (Shiffman, Hickcox, Paty, Gnys, et al., 1996a). Additionally, both Shiffman (1982) and Shiffman, Gnys, Richards, Paty et al. (1996b) found that one-third of relapse episodes occurred to maintain positive affective states (relaxation, 'good mood'), which suggests that people typically relapse to smoking to both alleviate affective discomfort *and* maintain current levels of comfort.

A central assumption the reformulated negative reinforcement model is that the affective constituents of the nicotine withdrawal syndrome should accurately index smokers' vulnerability to relapse. This assumption is supported by data which indicate that the affective components of nicotine withdrawal are strong predictors of relapse vulnerability in themselves and strong moderators of the relationship between withdrawal symptom severity

and relapse vulnerability (Baker et al., 2004; Piasecki, Jorenby, Smith, Fiore et al., 2003; Brown et al., 2005). Studies which have compared the abilities of physical (i.e. non-affective) and affective withdrawal signs and symptoms of nicotine dependence to predict relapse tend to report a predictive superiority of affective symptoms. For example, Kenford, Smith, Wetter, Jorenby et al. (2002) found that, when rated by 632 participants every week for eight weeks post-quit, withdrawal symptom severity – the best predictor of relapse from within the physical dependence model ahead of *history of drug exposure* (amount and consistency of nicotine self-administration), and *pattern of compulsive use* – failed to predict relapse at six-months post-quit when two affective variables (negative affect and subjective cumulative current stress) were included in the logistic regression model. The affective model provided greater accuracy in classifying long-term smoking status for this sample than the physical dependence model. These results suggest that it is the negative affect occasioned by withdrawal symptoms – not withdrawal symptom severity alone – which more accurately predicts smoking relapse.

Rapid increases in negative affect in response to acute stressors during nicotine withdrawal appear to be especially predictive of relapse. Shiffman and Waters (2004) found that lapses to smoking – an episode of smoking which violates continuous abstinence, i.e. even a single puff of a cigarette (Hughes et al., 2003) – were predicted by rapid elevations in negative affect that lasted only a couple of minutes, but not by day-to-day fluctuations in negative affect. This is consistent with Strasser, Kaufmann, Jepson, Perkins et al.'s (2005) finding that increases in negative affect during the first week post-quit are good predictors of full-blown relapse, and Piasecki, Niaura, Shadel, Abrams et al.'s (2000) finding that the temporal variability in levels of negative affect was more strongly related to cessation

outcome than the temporal variability in levels of physical symptoms of nicotine withdrawal (e.g. restlessness, hunger).

Lastly, people who view smoking as a good coping resource are more likely to escalate their smoking and smokers who smoke to cope in high negative affect situations are more likely to progress to a full-blown relapse. (Pomerleau, Adkins, & Pertschuk, 1978; O'Connell & Martin, 1987; Shiffman et al., 1996a). For example, Dugan, Lloyd, and Lucas (1999) found that viewing smoking as a good way to cope with stress significantly increased the likelihood that adolescents (aged 11 to 16.5 years) who had never smoked at time-1 would have progressed to occasional smoking (had smoked in the past but do not currently smoke one or more cigarette per week) 6 months later, and that occasional smokers at time-1 would have progressed to regular smoking (smoked at least one cigarette per week and had smoked over 20 cigarettes in total in their life) 6 months later. In other words, the belief that smoking relieves stress leads adolescents who perceive their lives as stressful to experiment with smoking and then escalate smoking as they develop an over-reliance on the stress-relieving benefits of smoking. Thus, in comparison to those who never smoke or those who sustain abstinence in the face of negative affect, starting smokers, increasers, and relapsers appear to be characterised by greater trait negative affectivity *and* by a greater desire to avoid negative affect and the situations which occasion negative affect.

3.7. SUMMARY OF NEGATIVE REINFORCEMENT THEORIES OF NICOTINE ADDICTION AND THEIR TREATMENT IMPLICATIONS

Abrupt cessation of smoking following a period of chronic smoking evokes physiological and affective experiences that are difficult to tolerate. The basic assumption of negative reinforcement theories of nicotine addiction is that nicotine dependent individuals with ready access to a nicotine source smoke primarily as a means to avoid or escape the negative affect which typically accompanies a significant period of nicotine deprivation. That is, after a period of abstinence, smoking tends to be reinstated in contexts of negative affect and stress which can derive from both pharmacologic (i.e. nicotine withdrawal) and non-pharmacologic sources (i.e. environmental cues), and the reduction of negative affect available through smoking provide powerful negative reinforcement for the continuation of smoking as a rapid, efficacious method of experiential control. Instead of making experientially difficult change efforts to facilitate some valued, long-term life change, the immediate affective relief available through smoking restricts the need for change, reduces the need to tolerate distress, and in this way keeps the individual from considering alternative modes of responding that are more consistent with the long-term goal of smoking cessation. The result is that smoking becomes over-learned as a method for coping with an increasing number of sources of distress, which ultimately contributes both to the difficulty of coping with nicotine withdrawal effects and to extinguishing smoking as a learned response to environmental stressors should the individual eventually become motivated to quit.

Though these individuals' smoking is hypothesised to occur reflexively under high levels of negative affect such that cognitive control resources do not compete with the processes of affective coping and regulation, Baker et al. (2004) hypothesise that it should be possible to interrupt these individuals' affective motivation under moderate levels of negative affect and enact less well-trained, adaptive behavioural responses in situations which commonly precipitate smoking. As such, the majority of well-known behavioural

interventions for smoking cessation today target a reduction of clients' negative affect and cognition and encourage them to avoid the people, places, and events that elicit these unwanted internal experiences. The linear assumption upon which these interventions are built is that clients' negatively evaluated private experiences should be targeted directly because these experiences are exerting direct control over actual smoking behaviour.

CHAPTER FOUR: COGNITIVE-BEHAVIOURAL THERAPY (CBT)

4.1. PHILOSOPHICAL ROOTS

Cognitive-behavioural therapy (CBT) as a general approach to treating psychopathology, has become the most widely utilised, extensively researched, and empirically supported of all psychotherapeutic methods (Norcross, Hedges, & Castle, 2002; Roth & Fonagy, 2005). CBT did not derive from any philosophy of human behaviour *per se*; however, the majority of well-known, modern versions of CBT embrace a philosophy of psychological mechanism which closely resembles mechanistic realism, or Newtonian determinism, which has long been embraced by physical scientists. Mechanists argue that the universe is made up of elementary parts, forces, and relations that are waiting to be discovered and that scientific investigation is the process of discovering and organising these phenomena into models which increasingly correspond to what is observed in reality. The accuracy of mechanistic models is determined by the extent to which a future event can be predicted from current knowledge of its relation to a known existing event, which may be observable or hypothetical. Implicit to the mechanistic philosophy is the assumption that

there exists a state of complete knowledge about the nature of reality, and a theory or statement is true to the extent that it yields discovery of more parts of this ontological reality. 'Truth', therefore, cannot be whatever one wants it to be, as is argued under contextual and pragmatic philosophies of science.

Perhaps the clearest example of ontological thinking about the nature of the mind is reflected in the multiaxial classification approach which informs psychiatric diagnoses, as described in *The Diagnostic and Statistical Manual of Mental Health Disorders, Fourth Edition* (DSM-IV: American Psychiatric Association, 1994), the text popularly known as the 'bible' or 'ultimate guide' for any professional who diagnoses and treats psychopathology. In this multiaxial approach, cognitions, emotions and behaviours, which exist as literal entities, are classified into syndromes which are then classified into five inter-related axes to form a hierarchy depicting numerous symptom-to-syndrome paths. Implicit to the syndromal classification system which dominates current thinking about mental health is the belief that there exists a state of 'healthy normality', that "psychological health is the natural homeostatic state that is disturbed only by psychological illness or distress" (Hayes, Strohsal, & Wilson, 1999: 4), and that modelling the relationship between and across subordinate and higher-order categories (i.e. similarities and differences) can help professionals to more accurately detect, classify, and remove symptoms of psychological illness.

4.2. THEORETICAL ROOTS AND THERAPEUTIC GOALS

In CBT, cognitions (i.e. thoughts, memories, images, beliefs, perceptions, attributions, attitudes, opinions, schemata, and intuitions) are treated as if they are concrete, distinct, manipulable entities which influence human behaviour in much the same way as the nuts,

bolts, and levers of a machine additively influence the overall working of the machine. The defining feature of CBT is the assumption that the frequency, form, intensity, and situational sensitivity of cognitions strongly moderate and influence the relationship between a stimulus and the expression and inhibition of the client's emotional, physiological, and behavioural responses. In this sense, cognitions that have been acquired through classical and operant conditioning processes are ascribed more influence over behaviour than the client's current environment and learning history (Forsyth, Lejuez, Hawkins, & Eifert, 1996; Forman & Herbert, 2007). Observable environments are not presumed to directly cause observable behaviours, but rather exert their influence by contributing to and eliciting the cognitions which directly cause behaviour. Environments are considered only to make inferences about what the client might be thinking and why he is thinking this way. Any therapeutic suggestion that the client restructures his environment is made only as a means to change his/her exposure to the problematic cognitions and emotions that are being engendered by these environments.

Just as glitches in the software of a computer program directly cause the program to malfunction, therapists view exaggerated or biased ways of thinking and feeling as 'bugs in the system' which are causing the maladaptive behaviour for which the client has sought treatment (Wegner, 1994a). And just as a computer programmer aims to fix, remove, or quarantine glitches in the software in order to restore the program to normal functioning, cognitive-behavioural therapists have traditionally focused on helping clients to avoid, change, reduce, eliminate, substitute, and otherwise control the cognitions and emotions which commonly precipitate maladaptive behaviour. These techniques are used in the belief that if clients can be trained to think more adaptively, they will feel and behave more adaptively (Beck, 1993; Forsyth et al., 1996; McGinn & Sanderson, 2001). The main

therapeutic goal of CBT, therefore, is to help clients to carry out intended behaviours, primarily by modifying the form and frequency of the cognitions which are presumed to be promoting their unwanted behaviours and inhibiting intended behaviours, and by modifying the behaviours which lead directly to the unwanted behaviour.

In modelling the relationships between cognitions, emotions, and behaviours in much the same way that a computer programmer predicts the overall functioning of a computer on the basis of his knowledge of the relationships between each of its parts, building increasingly accurate models of the mind as it is presumed to be should theoretically yield increasingly accurate predictions of how a client's behaviour should change when the mental nuts, bolts, and levers are manipulated. Based on this core mechanical hypothesis – a magnitude of change in the independent variable (cognition) should linearly correspond to the change in the dependent variable (behaviour) – therapists and researchers have tended to emphasise the goal of predicting psychotherapy outcomes but have typically been less concerned with investigating the theoretically-relevant processes of change, as evidenced by the low ratio of meditational studies to psychotherapy outcome studies in a number of behaviour domains. This lack of investigation of the variables mediating the therapeutic effect of CBT is believed to stem from the belief that the mechanistic nature of cognitive theories should dictate that CBT outcomes must be due to the occurrence of mediation effects that are consistent with the guiding theoretical assumptions about cognitive causality, i.e. that behaviour was changed because problem thoughts and feelings were corrected. In other words, the processes by which behaviour change is presumed to occur in CBT are "viewed merely as an extension of fundamental knowledge" (Hayes et al., 1999: 25).

Because cognitivists infer the existence and influence of unobservable behaviours (cognitions) from observable behaviours which closely correspond to the behaviours which

are predicted by their theories, the value of cognitive theories for changing behaviour rests squarely on their ability to predict behavioural outcomes. Good power of prediction, however, does not necessarily mean good power to *influence* behaviour change. That is, evidence of CBT efficacy which is unaccompanied by evidence, confirmatory or otherwise, that CBT's success resulted from changes in the frequency and/or form of problem thoughts and feelings – its presumed mechanisms of action – is of limited value to those who wish to apply CBT to other problems, populations, and contexts.

4.3. SOCIAL COGNITIVE THEORY OF ADDICTIVE DRUG USE

Social Cognitive Theory (SCT; Bandura, 1986) conceptualises addictive drug use as a learned maladaptive way of coping with the adverse effects of drug withdrawal and situational pressures to resume drug use which is acquired and maintained through associative and operant learning processes, and through the cognitive processes of self-efficacy and outcomes expectancies (Monti, Abrams, Kadden & Cooney, 1989). Addiction treatments that are based on SCT are typically organised around the central theoretical constructs of learning by association and learning by reinforcement, and tend to draw heavily from classical and operant learning theories of drug relapse.

In associative learning (classical conditioning) models of drug relapse, a previously neutral internal (e.g. an emotion) or external stimulus (e.g. a location) becomes a conditioned stimulus (CS) for drug use through repeated pairings (i.e. occurring in close temporal proximity to one another) of the neutral stimulus with drug use. When the individual then encounters the CS in the absence of the drug after the CS-drug association has been

established, the CS elicits a conditioned response (CR) which is subjectively experienced as craving or 'urge to use', which in turn motivates the person to resume drug use to alleviate the CR. That is, when an individual is confronted with cues that have signalled drug use in the past, his/her drug withdrawal symptoms become more intense. The motivational role of drug-cue associations is cited as the core feature of several theories of drug withdrawal, tolerance and relapse based on classical conditioning, e.g. conditioned withdrawal theory (Wikler, 1948), conditioned compensatory response theory (Siegel, 1975), and appetitive motivation theory (Stewart, deWit, H., & Eikelboom, 1984).

In operant learning theories, drug use is strengthened by the consequences which follow drug use; an individual is more likely to repeat use of a drug if use of this drug has tended to yield positive reinforcing effects, like an enhancement of pleasurable feelings, confidence, or euphoria, or negative reinforcing effects, like a reduction of negative affect, stress, and tension. As discussed earlier, recent operant learning-based theories of drug motivation have shifted the motivational basis of drug use from the physical to the affective constituents of the drug withdrawal syndrome (e.g. Baker et al., 2004).

In addition to the roles of learning history and environmental cues as determinants of drug-seeking behaviour, SCT identifies several factors based in current experience, cognition, and affect which can increase the likelihood of a relapse occurring in high-risk situations. Given the stressful nature of high-risk situations, Marlatt and Gordon (1985) state that the individual's (i) lack of a well-practiced adaptive coping response which could be shown instead of resorting to drug use; (ii) low confidence in one's ability to cope effectively without using drugs in these situations (i.e. low self-efficacy for alternative coping behaviours); and (iii) expectancies that using drugs will have positive or pleasurable effects in these situations are all key proximal determinants of relapse.

By contrast, Marlatt and Gordon's (1985) model predicts that the individuals who can successfully use alternative skills to meet needs that had previously been met through drug use in high risk situations should be less overwhelmed by urges to use drugs in high-risk situations and, therefore, develop a strong and realistic sense that they can function well without using drugs. In turn, these individuals should be more likely to choose to forego the immediate negative reinforcement available through drug use and instead utilise alternative skills to cope with drug withdrawal and persevere with abstinence in pursuit of the longer-term positive reinforcement that is available through quitting drug use. Stronger self-efficacy beliefs should also motivate individuals to persevere with quitting in the face of setbacks by resolving to try again. In essence, the guiding treatment hypothesis of the cognitive-behavioural model of addictive drug use states that, in addicted individuals, the negative reinforcing properties of drug use dominate the positive reinforcing qualities of not using drugs; therefore, increasing clients' access to positive reinforcers and decreasing their exposure to negative reinforcers through engagement in alternative behaviours and behaviours which distract from urges to use drugs should reduce clients' drug motivation.

4.4. COGNITIVE-BEHAVIOURAL COPING SKILLS TRAINING (CBST)

The U.S. Public Health Service (Fiore, Bailey, Cohen et al., 2000; Fiore, Jaén, Baker et al., 2008) and the U.K. National Institute of Health and Clinical Excellence (NICE, 2008) both endorse the social cognitive framework for conceptualising and treating tobacco dependence. Based in SCT, cognitive-behavioural skills training (CBST) is an intervention package that assumes that people who are motivated to quit smoking need only to acquire the skills to do

so. The key intervention functions of CBST for smoking cessation are therefore to understand what functions are currently being served by each client's smoking, to improve his/her cognitive and behavioural skills for coping in 'triggering' situations without smoking (i.e. rationalise and train alternative ways to meet these needs), and to foster his/her self-efficacy for using these alternative skills. With time and practice, clients are expected to respond readily and flexibly with alternative coping skills in situations which used to occasion smoking (Connors, Longabaugh, & Miller, 1996). Accordingly, techniques which increase clients' use of adaptive coping skills are presumed to be the active ingredients accounting for CBST's effectiveness in initiating and maintaining smoking abstinence.

The U.S. Public Health Service (Fiore et al., 2000; 2008) state that counselling and behavioural therapies for smoking cessation incorporating practical counselling (problem solving/skills training) and intra-treatment social support "should be used with all patients attempting tobacco cessation" (Fiore et al., 2000: p.iv). The following section briefly describes some of the components which would comprise a CBST intervention for smoking cessation. Each component can be conceptualised as one of four types of skills training that have been used most extensively in clinical and research settings: trigger-specific coping skills, mood management, social communication, and relapse prevention (Monti, Rohsenow, Colby, & Abrams, 1995).

4.5. Standard Components of CBST for Smoking Cessation

4.5.1. Conceptualise the Problem and Treatment

Failing to provide an adequate, coherent rationale for psychotherapy can reduce the perceived credibility of the provider and the treatment package, which in turn has been shown to predict more negative psychotherapy outcomes (e.g. Chambless, Tran, & Glass, 1997). The therapist introduces the rationale for coping skills training by explaining in simple terms that quitting smoking is difficult because smoking is both a learned habit and a way to increase levels of comfort. For example, clients may be told that some people smoke in order to feel better in the moment or to avoid feeling bad in the moment, and smoking can be such an effective way to meet these needs that people gradually become less willing to give up smoking and try other ways of meetings these needs. And after a while, things in the environment become associated with smoking, even without the smoker's awareness, such that exposure to these things can arouse the thoughts and feelings which they use smoking to eliminate. Fiore et al. (2000) recommend that therapists cite negative affect and stress, experiencing urges, low self-efficacy to refrain from smoking in the situations which typically lead to smoking, boredom, being around other smokers and smoking paraphernalia, drinking coffee or alcohol, certain times of the day, working under pressure, invitations to smoke, and the enjoyment of smoking as common smoking triggers or 'roadblocks' to quitting.

Clients are informed that the purpose of coping skills training is to help them avoid or cope better with the situations in which they tend to smoke and to develop new ways of coping in those situations which do not involve smoking. In other words, clients explicitly learn from the outset of treatment that exposure to certain stimuli is what is triggering smoking and that mastering the skills of avoidance, alteration, and substitution are key to quitting smoking.

4.5.2. Identify High Risk Situations

The therapist will conduct a functional assessment of clients' smoking histories to identify the situations and experiences which commonly precipitate smoking. This involves discussion of past quit attempts, current smoking patterns, the contexts in which smoking tends to occur, and common consequences of smoking so as to identify the factors that are associated with abstinence, lapses and relapses, and which needs are currently being met through smoking. Clients are encouraged to identify future situations in which foregoing smoking may be difficult (i.e. high risk situations), and to examine the situational, social, cognitive, emotional, and physiological aspects of those situations which could instigate smoking. Once clients' triggers have been identified, they can be ordered in terms of their negative impact and likelihood to occur and addressed as a matter of priority. By identifying the outcomes clients have sought through smoking, therapists can begin to propose alternative ways to achieve these outcomes.

4.5.3. Develop Skills to Avoid and Cope in High Risk Situations

Clients are trained to respond to smoking triggers in new, adaptive ways; refine and improve existing cognitive and behavioural responses to triggers; and act precipitously to eliminate the thoughts, emotions and behaviours which commonly lead to smoking. In-session discussion about how certain triggers might be differently responded to, likely outcomes, and encouragement to practice alternative responses between sessions should eventually result in these alternative responses being applied flexibly and easily in different situations, and replacing smoking as the dominant, reflexive mode of responding in situations which used to occasion smoking. Recommended strategies are those which distract clients' attention from thoughts and feelings which lead to smoking, keep them out of high risk situations, keep their

hands and mouths busy, increase their engagement in pleasure-enhancing/stress-reducing activities, change/break up their daily routines, and remove any physical opportunities for them to smoke. As each new skill is introduced, the therapist demonstrates to the client where, when, and how this skill may be used.

4.5.4. Change or Break Up Normal Routines

The therapist will raise clients' awareness of the times and situations that are strongly inked to their smoking, and state that in order to break these links they must change their routines (Health Education Authority, 2002). Therapists help clients to make plans to avoid triggers (stimulus control, environmental restructuring) or substitute alternative coping responses for smoking and smoking-directed behaviour (counter-conditioning). For example if a client has cigarette first thing in the morning, he may be advised to get up and have a shower instead; if a client tends to have a cigarette with a cup of tea or coffee, he may be advised to switch to drinking fruit juice or some other soft drink (without added sugar) for a while; if being in a pub or club enhances craving to smoke, the client may be advised to avoid these venues and socialise elsewhere for a while; if a client misses holding a cigarette in his fingers and his mouth, he may be advised to replace cigarettes with close proxies for a while, such as eating baby carrot sticks, fruit pieces, sunflower seeds, trail mix, chewing cinnamon-flavoured gum, or squeezing a stress ball. Commonly used but relatively less healthy proxies like candy sticks, lollipops, and chewing pens and pencils are discouraged. More generally, when it is possible and practical for clients to do so, therapists will advise and assist clients to change their habits and routines so as to reduce their exposure to common and person-specific triggers, which may include alcohol, sugary drinks, red meat, snacks, other smokers, and smoking

paraphernalia (ashtrays, lighters, rolling skins, tobacco pipes, loose tobacco tins, cigarette cartons).

4.5.5. Eliminate Opportunities to Smoke

On common testimony from smokers that their smoking occurs fairly reflexively – i.e. they smoke out of habit rather than for reinforcement reasons in certain situations and they can smoke several cigarettes without having made a conscious decision to smoke – strategies which make smoking physically impossible may be advised during the experientially tougher early stages of abstinence. Strategies may include throwing all cigarettes in the bin or cutting up cigarettes, not carrying a carton around, only carrying around enough money for essential purchases like a train fare or lunch, or asking a trusted friend to hold one's wallet for a period of time.

Smokers are likely to be offered cigarettes, perhaps persistently, by friends and colleagues; Ary and Biglan (1988), for example, found that smokers received 24 times as many offers to smoke than did non-smokers over a one-year period. Learning how to refuse cigarettes and opportunities to smoke are therefore viewed as essential skills for successful quitting. Therapists may train ways to politely decline invitations to join friends in designated smoking areas (e.g. shelters), refuse offers of cigarettes, and ask friends and family to support their quitting efforts by not offering cigarettes and not responding angrily to clients' refusals to join in with usual smoking. In the same vein, recruiting friends and family to provide encouragement and practical assistance for quitting can keep the client from being placed under additional, frivolous burdens, and keep the client motivated to quit (behavioural

contracts/helping relationships). The therapist may advise clients as to how they can explain to friends and family that they are trying to quit smoking, and how to ask for their help.

4.5.6. Get Involved in Distracting Activities

Therapists will encourage clients to get involved in activities which decrease their exposure to trigger situations and distract their attention from stimuli which increase stress and enhance urges to smoke. Making plans for the weekend, making a shopping list, reading a book, doing a crossword or Sudoku puzzle, playing computer games, doing some gardening, watching TV, walking the dog, doing the washing up, going to the cinema or the gym, practicing breathing exercises, and phoning a supportive friend may all be posited as functional alternative ways to cope with stress and reduce attention to smoking cues. Strategies which involve exercise and laughter are also recommended because they are good stress reducers. Clients will be encouraged to come up with their own strategies for reducing stress and avoiding triggers in their own lives, and discuss with the therapist how, where, and when their distraction strategies may be most needed.

4.5.7. Manage Negative Thoughts and Feelings

As relapse tends to occur in the context of negative feelings and contingent negative cognitions, learning to avoid, alter, and substitute negative thoughts and feelings which have historically instigated smoking are crucial steps to initiating cessation. Clients are trained to recognise when negative thoughts and feelings are occurring and practice substituting positive

thoughts and feelings, stopping thoughts, and positive self-talk. Learning to stay calm in/escape situations which typically cue stressful feelings, learning to handle criticism, and learning to resolve arguments are all emphasised as key skills. Clients may be advised to walk away from stressful situations, use 'calm down' phrases to reduce anger and frustration, notice when voices are being raised and reduce the volume to a normal level, avoid getting into an argument when there is no time to resolve the argument, learn to 'agree to disagree', practice deep breathing and relaxation techniques, or take a walk alone and get some fresh air.

Acting precipitously to prevent stressful arguments by asking friends and colleagues for extra support, compassion, and patience while he/she is trying to quit smoking is recommended. If friends and colleagues are supportive, they may decide against complaining, arguing, or otherwise adding to the client's burden when doing so is not absolutely necessary. Lastly, if the client is spending a lot of time in stressful situations (or in contrast, a lot of time doing nothing in particular), therapists may recommend putting more time aside for pleasurable and valued activities, and probe the client for the types of activities he enjoys but feels he doesn't currently do as often as he'd like.

4.5.8. Give Basic Information About Smoking and Successful Quitting

Basic psycho-education about smoking and quitting typically includes telling clients that total abstinence is often necessary for long-term success for dependent smokers (i.e. occasional smoking is not usually a viable option) because evidence suggests that even a single puff can lead to a full-blown relapse; unlike alcohol, there are no known health benefits of any quantity of tobacco smoking; withdrawal symptoms typically peak within 1-3 weeks after quitting; information about the addictive nature of nicotine; and information about how the body and moods change during nicotine withdrawal.

Emphasis will typically be placed on the importance of using strategies which reduce negative affect and craving in the early stages of a quit attempt. This is based on evidence which suggests that negative affect and withdrawal symptoms, including craving, emerge within six to twelve hours of the last nicotine intake, peak within one week, and fade to pre-cessation levels within approximately four weeks (Gilbert et al., 2002); approximately 50% of quitters (unassisted and assisted) lapse to smoking within the first week (Garvey, Bliss, Hitchcock, Heinold, & Rosner, 1992; Ward, Klesges, Zbikowski, Bliss, & Garvey, 1997; Zhu et al., 2000; Doherty, Kinnunen, Militello & Garvey, 1995); and, upwards of 80% of people who experience an early lapse (within first post-quit week) subsequently progress to a full-blown relapse (Marlatt & Gordon, 1985; Ward et al., 1997; Kenford, Fiore, Jorenby, Smith et al., 1994; Brandon et al., 1990; Garvey et al., 1992; Shiffman et al., 1996a).

4.5.9. Develop Skills For Preventing a Relapse

CBST will typically conclude with training on how to prevent a relapse to smoking after the quit day. This component is typically scheduled for delivery on or after the client's quit day to provide additional reinforcement and, if applicable, intra-group social support for quitting. Relapse prevention strategies are functionally similar to those trained for coping with specific triggers and urges, but differ in that the focus shifts to identifying situations which could derail or undermine the client's initial gains in quitting smoking and putting in place contingencies for preventing a relapse beyond the end of the treatment period (Hajek, Stead, West, Jarvis, & Lancaster, 2009). Relapse prevention skills training has been delivered as a treatment to facilitate initial smoking cessation (i.e. abstinence initiation), as a stand-alone or adjuvant to another formal treatment programme with a focus on maintaining initial positive therapeutic effects (i.e. abstinence maintenance), and as a stand-alone treatment for individuals

who have already relapsed or fear they may soon relapse (i.e. abstinence re-initiation). According to Hajek et al. (2009), the main argument in favour of providing relapse prevention skills training to individuals before they have stopped smoking is that relapse prevention skills could be very useful to people even in the early stages of quitting smoking. With regard to people who have stopped smoking, Fiore et al (2000) recommend that, because the tendency to relapse to smoking can persist for up to several years after quitting, relapse prevention interventions may also benefit the long-term quitters who no longer consider themselves part of the quitting process.

The therapist will train clients to notice when their motivation is flagging and when they are rationalising a temporary lapse to smoking (e.g. "Just one won't hurt", "I can't concentrate on my work unless I smoke"). Celebrating quitting milestones and rewarding one's self with treats for successfully coping in high risk situations (reinforcement management) are recommended as good ways to stay motivated. Clients are encouraged to remind their friends and family of their quit date and bring them on board to provide support over the experientially tough first few weeks. Therapists develop clients' skills for requesting behavioural changes, understanding, and patience from others when their moods are fluctuating and daily routines are being changed, and clients' skills for negotiating and compromising with partners and work colleagues to remove environmental triggers from sight and smell as far as is feasible to do so.

Relapse and remission are conceptualised for clients as processes of change or normal rehearsals for eventual success rather than an end-states, and preventing or limiting the frequency of relapse episodes is set as a realistic goal for both therapists. Clients are encouraged to view smoking lapses, or slips, as a normal part of the process of quitting, not the end of the process. They are encouraged to forgive themselves if they do lapse, to remain

upbeat, regroup, and to view the lapse as a learning experience, as an opportunity to find out what went wrong, what could have been done better, and what can be changed for the future.

4.6. MEASURING THE EFFICACY OF CBST-BASED INTERVENTIONS FOR SMOKING CESSATION

The term 'efficacy' in descriptions of the effect of a formal treatment condition/manipulation on a smoking outcome typically refers to "showing a treatment effect in a study with high internal validity, that is, a study that uses highly motivated participants, standardized treatment protocols, and under an ideal highly controlled research environment" (Hughes, Peters, & Naud, 2011: 512). The efficacy of behavioural interventions for smoking cessation across different types, formats, structures, and intensities of intervention in general and special populations has been most comprehensively reviewed by the Cochrane Tobacco Addiction Review Group[1] (CTARG) and the United States Public Health Service's Clinical Practice Guidelines Panel (USPHS) (Fiore et al., 2000, 2008). The meta-analytic techniques employed by these groups are widely recognised as the 'gold standard' evaluation of pooled intervention effects from published and unpublished randomised controlled trials (RCTs), and provide direction for national clinical guidelines pertaining to the treatment of tobacco dependence (e.g. NICE, 2008). Typical minimum criteria for a trial's inclusion in CTARG and the USPHS's meta-analyses include: (i) the randomisation or cluster randomisation of participants/patients to tobacco-use treatment conditions and a detailed description of the randomisation procedure; (ii) a comparison of an active treatment against a bona fide control

[1] The full list of reviews of smoking cessation treatments conducted by the CTARG can be found at http://www2.cochrane.org/reviews/en/topics/94.html.

or placebo condition or another bona fide active treatment; (iii) a clear description of the content and procedures for delivery of intervention component techniques; and (iv) reporting analyses of prolonged (i.e. continuous) or multiple point prevalence smoking abstinence data collected at follow-up time points up to at least five months after the quit date and, when applicable, the provision of a detailed description of the method used for cotinine or biochemical verification of self-reported smoking status. Pooled estimates of the efficacy of an intervention or intervention component for long-term abstinence are indicated by the odds ratio (OR) or relative risk ratio (RR)[2] statistic. An OR of 1.5, for example, for coping skills training indicates that clients who received coping skills training had a 50% greater chance of being abstinent at a follow-up assessment than did clients who did not receive coping skills training. Abstinence percentages are estimates of the long-term abstinence rate produced by an intervention or intervention component which are derived from the odds ratio statistic.

The following section summarises the conclusions drawn by systematic reviews and meta-analyses about the efficacy of behavioural smoking cessation interventions which were based on the cognitive-behavioural coping skills training approach. Unless otherwise stated, the term 'long-term abstinence' in this section refers to no smoking at all (not even a puff) on any of the past seven days (i.e. the seven-day point prevalence measure of abstinence), as indicated by self-report or biochemical data at six months or longer after the quit date.

4.7. REVIEW OF DATA ON CBST'S EFFICACY FOR SMOKING CESSATION

[2] As of 2006, the CTARG began to use the relative risk ratio rather than the odds ratio for estimating pooled effects of interventions. It is important to note this distinction when comparing the pooled estimates across meta-analyses because the relative risk ratio tends to suggest a smaller intervention effect than the odds ratio. For example, if 20 of 100 participants quit smoking in the active intervention group and 10 of 100 participants quit in the control group, the relative risk ratio is 2.0 [(20/100)/(10/100)] and the odds ratio is 2.25 [(20/80)/(10/90)]

Carroll's (1996) qualitative review of 24 trials concluded that relapse prevention interventions showed comparable efficacy to other active treatments for five substance use disorders (smoking, alcohol, marijuana, cocaine, other drug use), greater efficacy than no-treatment control conditions, and inconclusive efficacy when compared to attention and discussion control conditions. However, while relapse prevention interventions did maintain treatment gains and reduce the severity of relapses which did occur during follow-up periods, these benefits diminished with increasing time since treatment completion. Relapse prevention interventions were found to be equally effective across all classes of substance use disorders and especially efficacious for clients who had more severe substance use problems, higher levels of negative affect, and lower efficacy beliefs about the effectiveness of coping skills which did not involve smoking.

In contrast, Irvin, Bowers, Dunn, and Wang's (1999) meta-analysis of 26 trials (N = 9504) found that the efficacy of relapse prevention interventions was strongly moderated by the class of substance use being treated, with strong and reliable effects of relapse prevention interventions found for alcohol (r = 0.37[3]) and poly-substance use (r = 0.27) but considerably weaker yet still statistically significant effects for smoking (r = 0.09). Relapse prevention interventions were not found to be efficacious for reducing cocaine use (r = -0.03), though only three trials were examined. Across all substances, relapse prevention interventions were more efficacious than brief advice from a physician (r = 0.33), only marginally more efficacious than wait-list and no-additional-treatment control conditions (r = 0.11) and less efficacious than

[3] Positive correlations indicate the extent to which RP interventions produced greater reductions in substance use than comparison interventions (no-additional-treatment controls, other active interventions, discussion controls, physician advice, or uncontrolled pre-post tests).

other active treatments (r = -0.19) for reducing substance use. The modality in which relapse prevention interventions were provided had little impact on treatment outcomes.

In 1998, the American Psychological Association's *Division 12 (Clinical Psychology) Task Force on Psychological Interventions* recognised multicomponent CBST incorporating relapse prevention skills training as a category one empirically-supported psychological intervention for smoking cessation (well established: at least two good between group design experiments demonstrating efficacy in one or more of the following ways: A. Superior to pill or psychological placebo or to another treatment; B. Equivalent to an already established treatment in experiments with adequate sample sizes, i.e. the design was sufficiently powered to detect medium effect sizes) (Chambless & Hollon, 1998). By comparison, motivational interviewing did not fulfil criteria for a category one or category two (probably efficacious, pending replication: at least one RCT in which the treatment has been shown to be efficacious compared to a control group or an alternative bona fide treatment) recommendation as an empirically-supported treatment for any chemical abuse or dependence, including smoking cessation.

A category one recommendation seemed all the more impressive in 1998 given subsequently reported data that indicated that cognitive-behavioural interventions for smoking cessation had yielded progressively poorer long-term abstinence rates in their clientele between 1977 and 1996 (Irvin & Brandon, 2000). These authors' review of 23 US-based published trials examining the cessation efficacy of group-administered CBST interventions revealed significant negative correlations between year of publication and abstinence rates at end-of-treatment (sixteen trials; r = -0.45), three-month follow-up (thirteen trials; r = -0.55), and six-month follow-up (seventeen trials; r = -.031). The authors caution that these robust declines in abstinence rates do not necessarily indicate a diminishing efficacy of CBST interventions for

producing smoking abstinence, but instead are consistent with the 'hardening of the target' hypothesis (Hughes, 1993). This hypothesis states that as a consequence of the significant decrease in smoking prevalence in the US over the past 25 years, the authors propose that the population of remaining smokers may be harder to treat than those who did quit. That is, remaining smokers are more likely than ex-smokers to possess risk factors which make quitting difficult. While compelling theory (Warner & Burns, 2003) and empirical evidence (Giovino, Chaloupka, Hartman, Gerlach Joyce et al., 2009) have since refuted the 'hardening' hypothesis', two hypotheses which better fit Irvin and Brandon's (2000) data are that either CBST lacks general efficacy for facilitating smoking cessation or that CBST has efficacy for smoking cessation in specific sub-populations of smokers.

In 2000, a meta-analysis of 62 trials, examining a total of eleven types of counselling and behavioural therapy for smoking cessation, conducted on behalf of the U.S. Public Health Service (Fiore et al., 2000), identified three types of counselling and behavioural therapy that significantly increased motivated-to-quit clients' odds of long-term abstinence (five+ months), relative to no treatment (i.e. untreated control conditions). These were: (i) practical counselling (problem-solving/coping skills training) (OR = 1.5, CI95: 1.3 to 1.8; abstinence rate = 16.2%, CI95: 14.0 to 18.5); (ii) providing interpersonal support for the client within treatment (OR = 1.5, CI95: 1.1 to 2.1; abstinence rate = 16.2%, CI95: 11.8 to 20.6); and (iii) providing help to secure social support for the client out-with treatment (OR = 1.3, CI95: 1.1 to 1.6; abstinence rate = 14.4%, CI95: 12.3 to 16.5). It is important to note that the individual study effects were treated as fixed effects, and client characteristics and treatment elements were treated as random effects within a logistic regression model to account for heterogeneity of sample and treatment characteristics across trials.

On the basis of these data, the U.S. Clinical Practice Guideline Panel recommended that practical counselling should be offered as part of all forms of behavioural support for quitting smokers and should involve training clients to identify situations which pose a high risk for smoking, developing a range of cognitive and behavioural skills to avoid and cope in these situations, and providing clients with basic information about smoking and successful quitting. As part of the intra-treatment social support component, therapists are advised to bolster clients' motivation to quit and strengthen their self-efficacy beliefs that they are capable of quitting successfully at this attempt, communicate care and concern about what they are going through, and encourage clients to talk about the quitting process. In 2008, the Guideline Panel renewed their recommendations for practical counselling (problem solving/skills training) and intra-treatment social support to be provided to all smokers who seek assistance to quit, either alone or in combination with pharmacotherapy.

It is important to note that the Guideline Panel deemed that the strength of evidence for neither the provision of practical counselling nor intra-treatment social support warranted a category "A" rating (defined as "multiple well-designed RCTs, directly relevant to the recommendation, yielded a consistent pattern of findings"; Fiore et al., 2000: 19) for several reasons. First, as behavioural techniques of the reviewed trials were rarely delivered and evaluated in isolation, it was difficult to determine the true therapeutic effect of each component; second, as certain behavioural techniques were likely delivered for longer periods of time and different numbers of sessions, it was difficult to control for exposure when evaluating the effect of each component; third, all reviewed counselling and behavioural interventions were compared to no contact/control conditions which did not control for placebo effects of treatment, and so, further limited the reviewers' capacity to deduce the true effect of the active treatment components; fourth, many of the reviewed interventions had tailored the

application of counselling and behavioural techniques to meet the needs of specific sub-groups of smokers, thereby limiting the generalisability of study findings to the heterogeneous samples which present for help at community smoking cessation services; and fifth, there was considerable heterogeneity in how techniques were applied within interventions. For these reasons, practical counselling and intra-treatment social support were given category "B" ratings (defined as "some evidence from RCTs supported the recommendation, but the scientific support was not optimal, e.g. few RCTS existed, the trials that did exist were somewhat inconsistent, or the trials were not directly relevant to the recommendation"; Fiore et al., 2000: 19) in 2008 (Fiore et al., 2008).

In the most up-to-date meta-analysis of smoking cessation interventions which were based on Marlatt and Gordon's (1985) relapse prevention model, Hajek et al. (2009) separately reviewed 36 trials in which participants had been randomised to treatment after they had quit smoking for a short period (i.e. with the goal preventing relapse), and eighteen trials in which participants had been randomised to treatment prior to their quit date (i.e. with the goal of initiating abstinence). These trials compared standard relapse prevention interventions against shorter interventions and interventions not oriented towards relapse prevention. The reviewers found relapse prevention interventions did not produce significantly higher point prevalence abstinence[4] rates at six-month follow-up among individuals undergoing forced abstinence. These individuals were pregnant (eight trials, n = 1523, RR = 1.04, CI95: 0.98 to 1.11) and postpartum ex-smokers (twelve trials, n = 3273, RR = 1.07, CI95: 0.98 to 1.18), hospital inpatients (three trials, n = 667, RR = 0.94, CI95: 0.78 to 1.13), and military recruits (three trials, results not pooled due to unclear denominators and results reported corrected for clustering). In addition, no significant prevention benefit of relapse prevention interventions

[4] Number of participants not smoking at the time of assessment but not necessarily continuously since post-treatment.

was found for individuals who had initially quit smoking on their own (five trials, n = 3561, RR = 1.08, CI95: 0.98 to 1.19) or for individuals who received relapse prevention skills training after having quit following a formal treatment intervention (five trials, n = 1462, RR = 1.00, CI95: 0.87 to 1.15).

With regard to initiating abstinence, the review found no significant cessation benefit of relapse prevention interventions in group or individual formats for individuals who were randomised to treatment conditions before their quit date (ten trials, n = 872, RR = 0.91, CI95: 0.73 to 1.13). Relapse prevention interventions and control interventions in these trials were matched on contact time, and all but one of these trials involved treatment contact beyond four weeks. The review also found no significant cessation benefit of relapse prevention interventions was found for individuals who were randomised to treatment conditions of varying intensity before their quit date (seven trials, n = 699, RR = 1.01; CI95: 0.80 to 1.27). The reviewers also note that negative efficacy findings were consistent across the individual trials. These negative efficacy findings for relapse prevention interventions for people who have not yet quit smoking are consistent with Stead and Lancaster's (2009) recent meta-analysis of group therapies for smoking cessation, which found no significant cessation benefit of including skills training/cognitive-behavioural components in group therapy (eight trials, RR = 1.15, CI95: 0.97 to 1.37).

Hajek and colleagues cite several methodological and content limitations of the trials included in their review which may render the negative efficacy findings suggestive for the moment. Most trials did not use the experimental designs that are best suited to comparing the efficacy of interventions, only a small number of trials had an adequate sample size to detect meaningful treatment effects, and most trials which randomised abstainers to treatment condition used brief or written interventions rather than more intensive formats (e.g. face-to-

face, via telephone). Hajek and colleagues' use of the risk ratio instead of the less conservative odds ratio to summarise interventions effects may also have contributed to the disparate findings, though any effect is likely to be very small.

Notwithstanding these potential limitations, the reviewers concluded that there is insufficient evidence at present to support the use of behavioural interventions which focus on training relapse prevention skills for helping people who have successfully quit smoking for a short period of time to avoid relapsing to smoking (i.e. initial abstainers), or for helping people to quit in the first place (i.e. attempting quitters). This lack of efficacy specifically concerns techniques for identifying and coping with high risk smoking situations. In other words, there is presently insufficient evidence to support the basic assumption of these interventions: that training relapse prevention skills helps people to quit and stave off relapse.

4.8. Evidence for Performance of Coping Skills as the Mechanism of Action in CBST

Acquisition and performance of adaptive coping strategies/skills is assumed to be the mechanism accounting for CBST's success in facilitating smoking abstinence. To demonstrate that performance of coping skills is the critical mechanism of action in CBST, one would need to show that (i) CBST increases clients' use of coping skills; (ii) higher coping predicts better outcomes; (iii) the direct effect of treatment on outcome is significantly weaker than the indirect effect of treatment on outcome transmitted through a coping mediator variable. If these three effects are found, a mediational relationship can be said to exist between a treatment, coping, and outcome.

Studies which assess the significance of the relationships between the intervention-mediator variables and between the mediator-outcome variables are rare, however, due in part to greater pressure from funding bodies and a lesser emphasis on conducting mediational analyses to supplement outcome analyses, more complex statistical techniques which are not as yet widely taught as part of social science courses, and, until only very recently, most popular statistical software packages did not provide functions for modelling mediation effects. More generally, the low ratio of mediation to outcome studies in the context of smoking cessation has undoubtedly hindered the development of more effective behavioural interventions because without evidence, for example, that interventions which claim to increase participants' use of coping skills do actually increase their use of coping skills, and that those participants who report greater use of coping skills do then achieve more positive outcomes, researchers cannot know whether these interventions failed to improve outcomes because the participants acquired new skills but these skills were not essential for changing behaviour or because the new skills were not delivered by therapists or acquired by participants as intended.

A review of the evidence of the mechanisms of action in CBST for alcohol dependence conducted by Morgenstern and Longabaugh (2000) provides a useful indication of the role of coping skills in the cessation of addictive behaviours. These authors identified nine studies in which participants with a diagnosis of alcohol dependence had been randomised to either CBST or another treatment for alcoholism, and which examined the relationship between post-intervention coping and drinking outcomes in each treatment condition when controlling for baseline coping levels. Only one of these nine studies identified a measure of social skills which even approached status as a statistical mediator of drinking outcome in CBST. The remaining eight studies found that either CBST increased

coping further than the comparison treatment but these increases did not significantly predict drinking outcome, or that increases in coping skills did predict more positive drinking outcomes but coping did not differ between CBST and the comparison treatments at post-treatment. In other words, either coping skills did not play a significant role in the recovery process or coping was not a unique active ingredient of CBST, and no other conclusions about the active ingredient contributing to CBST's effectiveness could be drawn. The authors concluded that researchers do not yet know how CBST works to improve drinking outcome, nor whether coping skills are a necessary or unique element of CBST for improving drinking outcomes.

4.9. SUMMARY OF CBST FOR SMOKING CESSATION

Overall, meta-analytic data reported over the past 20 years suggest that, despite their early promise, smoking cessation interventions based on social cognitive theory have failed to have the public health impact that had been hoped for (Shiffman, 1993; Kahler, Zvolensky, Goldstein, & Brown, 2003). While the six-month abstinence range of 14 to 19% associated with the receipt of practical counselling (general problem-solving/coping skills training) is significantly higher than the 0.5 to 5% of smokers who quit each year without assistance, the fact that 81 to 86% of smokers do not achieve long-term abstinence with interventions which include a practical counselling component suggests a need for new behavioural components and component packages which better meet the needs of recalcitrant smokers.

Taking into account the methodological differences between meta-analyses, Hajek et al. (2009) offer two possible explanations for their null effects of skills training interventions

for smoking cessation. The first is that the basic assumption of CBST is still valid – individuals who wish to quit smoking but lack a range of alternative skills to cope in high risk situations, and lack confidence to utilise these skills, should be most likely to relapse when exposed to high risk situations. Providing individuals with a range of healthier, alternative ways to reduce the impact of nicotine withdrawal, negative affect, and other conditioned stimuli for nicotine cravings, and boosting their confidence to utilise and persist with these alternatives, should therefore help motivated-to-quit individuals to continue to choose to not smoke and not feel overwhelmed by any urges to smoke. If this is the case, the null effects reported by Hajek et al. (2009) may be attributable to poorly conceptualised interventions or therapists' poor adherence to well-conceptualised interventions. Treatment trials which include mechanisms for monitoring how closely therapists had adhered to treatment components, and which assess how well clients had understood, practiced, and utilised taught skills and concepts should provide the best test of efficacy of a well-conceptualised CBST-based intervention for smoking cessation.

Alternatively, Hajek et al. (2009) state that we must consider the possibility that interventions based on the coping/relapse prevention skills training approach do not actually help the majority of people to stop smoking. Given CBST's emphasis on the importance of avoiding and escaping the array of thoughts, emotions, physical sensations, and external environments which have become conditioned stimuli for smoking, the fact that the majority of clients who receive CBST resume smoking in the long-term suggests a promising hypothesis for investigation: there is something about trying to avoid smoking cues as part of a quit plan which makes it difficult to do so.

CHAPTER FIVE: ACCEPTANCE AND COMMITMENT THERAPY (ACT)

5.1. THE NEED FOR GOOD ALTERNATIVES TO CBST

In the course of their review of relapse prevention interventions for smoking cessation, Hajek et al. (2009) discovered that hardly any evidence was available on behavioural approaches to smoking cessation that were not based on the CBST approach, and so recommended that future studies "may be better advised to focus on alternative approaches not studied extensively or at all so far" (p14). In light of the limited success of CBST interventions in helping people to quit smoking in the long-term, it is surprising that no new behavioural interventions have emerged in the past 20 years as an alternative to the CBST approach. Leaders in the smoking cessation treatment field have also expressed their concern at the lack of progress that has been made in developing new empirically-supported behavioural interventions (Shiffman, 1993; Hajek, 1996; Brandon, 2001; Niaura & Abrams, 2002) to jump-start abstinence rates that appear to have stagnated and even declined over the past decade or so (Hajek et al., 2009). More generally, Wilson, Hayes, & Gifford (1997) argue that, in the absence of good alternatives, cognitive-behavioural therapies for a variety of problems have become dominant over the past 20 years largely primarily because of their practical utility in adult outpatient settings, not their operative power for treating psychopathology.

5.2. THE RISE OF BEHAVIOUR ANALYTIC ACCEPTANCE-BASED PSYCHOTHERAPIES

Borne from a disagreement with traditional CBT's core assumption that significant cognitive change is necessary for clinical improvement in most people, and concern that therapists' reinforcement of the idea that 'bad' cognitions cause 'bad' behaviour plays into the very social-verbal system which promotes the excessive, inflexible avoidance coping behaviours that are characteristic of a number of psychopathologies, a number of functional behaviour analytic, acceptance-based psychotherapies have emerged as intriguing alternatives to traditional cognitive and behavioural therapies over the past 20 years. These behaviour analytic therapies represent movement away from the content-oriented 'out with the bad, in with the good' approach of CBT back to the 'change what you do with what you have' approach of functional analytic models of language and cognition. They include Acceptance and Commitment Therapy (ACT: Hayes et al., 1999); Functional Analytic Psychotherapy (FAP; Kohlenberg & Tsai, 1991); Integrative Behavioural Couples Therapy (IBCT: Jacobson & Christensen, 1996; Jacobson, Christensen, Prince, Cordova, & Eldridge, 2000); and Mindfulness-Based Cognitive Therapy (MBCT: Segal, Williams, & Teesdale, 2002; Segal Teesdale, & Williams, 2004), among several others[5]. These therapies are organised around the interdependent therapeutic principles of psychological acceptance and flexibility, mindfulness, commitment to valued action, behaviour in context, and cognitive defusion. They share the prediction that the frequency or form of negatively evaluated private events are not now nor ever have been the source of clients' suffering; rather, suffering is assumed to stem from their evaluations of private events as 'negative' on the basis of their close temporal association with problem behaviours, the tendency to take these negative evaluations literally, and the resulting desire to control these private events in the misguided

[5] Dialectical Behaviour Therapy (DBT: Linehan, 1993) is commonly cited as a core 'third wave' behaviour therapy; however, its creator, Marsha Linehan, has recently stated that she does not consider DBT to be part of this 'third wave, but as a form of CBT which integrates acceptance coping strategies.

expectation that more control over private events will yield more control over behaviour. By building acceptance of all private experiences and altering the social-verbal contexts which create cognitive fusion and rationalise inflexible avoidance coping behaviour rather than directly changing the frequency or form of negatively evaluated private events, behaviour analytic therapies are considered by their proponents to signify a brand of behaviour therapy that is philosophically and technically distinct from traditional cognitive-behavioural therapies.

5.3. ACCEPTANCE AND COMMITMENT THERAPY (ACT)

Acceptance and Commitment Therapy (ACT: Hayes et al., 1999) is a model of intervention and behaviour change techniques which is explicitly linked to a pragmatic philosophy of science and a research programme on the relational nature of human language and cognition. *Acceptance* is defined as actively engaging in the process of experiencing all thoughts, memories, images, feelings and so on, fully and without attempting to change these experiences (Hayes, et al., 1999). *Commitment* is defined as the process of choosing behaviours which are consistent with valued goals in the presence of private experiences and situational events that have historically functioned as conditioned stimuli for maladaptive, values-inconsistent behaviour.

According to the ACT model, the primary source of psychopathology is psychological inflexibility, defined as an inability or unwillingness to persist with or change behaviour in service of long-term valued ends (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). The fundamental goal in ACT is to build up the processes which increase psychological

flexibility, defined as being able to contact the present moment more fully as it is, not what it says it is, and being willing to persist and change behaviour when it is possible to do so in service of long-term valued goals at the expense of short-term experiential comfort (Hayes et al., 1999).

The ACT model identifies six inter-related, behavioural repertoire-narrowing processes which contribute to psychological inflexibility – cognitive fusion, experiential avoidance, a lack of clarity about one's core values, a loss of flexible contact with the present moment, an attachment to a conceptualised self, and inaction, impulsivity or avoidance persistence – and six corresponding repertoire-expanding processes which increase flexibility – cognitive defusion, experiential acceptance, clarity of values, being present in the moment, self-as-context, and commitment to valued action. These six therapeutic processes, each of which "is conceptualised a positive psychological skill, not merely as a way of avoiding psychopathology" (Hayes et al., 2006: 7), can be categorised further: cognitive defusion, acceptance, self-as-context, and being present are all *acceptance and mindfulness* processes; clarity of values and commitment to action are *commitment and behaviour change* processes. At its most fundamental then, ACT is a cognitive and behaviour change intervention which uses acceptance, mindfulness, and commitment processes to increase clients' cognitive and behavioural flexibility. The intervention aims to rationalise and teach acceptance and mindfulness techniques which weaken the influence of the literal, evaluative functions of the verbal content of cognition over behaviour and increase flexible contact with the environmental contingencies that are available in the present moment, while strengthening the client's commitment to persisting with or changing behaviour in service of what he/she truly values in life. That is, acceptance of previously avoided private experiences is hypothesised to reduce the aversive functions of negative private events, weaken the

functional relations between negatively evaluated private events and corresponding maladaptive behaviours, and increase the client's willingness and ability to persist and change behaviour in service of valued goals while remaining in contact with all experiences.

5.4. Appropriate Clinical Contexts for Applying ACT

ACT may be an appropriate treatment option for any psychopathological problem which has some form of experiential avoidance as a central diagnostic criterion. Specifically, ACT may be relevant to psychological or behavioural problems that are characterised by (i) an excessive and rigid faithfulness to avoidance behaviour, even when doing so is counter-productive; (ii) a belief in the literality of one's thoughts; and (ii) a lack of clarity about one's valued goals and a perceived lack of ability to behave in line with these goals. ACT may also have value in the treatment of individuals who have not benefited from psychotherapy interventions which endorse an anti-acceptance approach to difficult cognitions, such those which teach clients how to restructure, dispute, challenge, distract, replace, and suppress their unwanted thoughts.

ACT, therefore, represents a promising alternative to CBST in the behavioural treatment of nicotine dependence for five reasons: (i) avoidance or escape of negative affect and other withdrawal distress is commonly cited by quitting smokers' as their prepotent motive for resuming smoking after a period of abstinence; that is, they find it difficult to forego short-term experiential comfort available through smoking in service of the longer-term valued benefits of quitting smoking; (ii) smokers commonly report that their smoking is literally triggered by the experience of certain thoughts, emotions, and external cues; that is,

they tend to believe in the literal functions of things that are so-called ‘triggers’; (iii) when the literal, evaluative functions of ‘triggers’ dominate over those based in actual experience, quitting smokers’ anticipated or on-going exposure to ‘triggers’ increase the incentive value of behaviours which are tightly linked to the rapid, efficient alleviation of urges to smoke, i.e. resuming smoking; (iv) correlational, experimental and clinical data suggest that the use of avoidance-based coping strategies by quitting smokers is positively associated with vulnerability to relapse; and (v) behavioural smoking cessation interventions which focus on developing clients’ skills for avoiding and coping in high risk situations (where ‘coping’ usually means ‘escaping from’) produce long-term abstinence in only a minority of clients. The following sections describe the philosophical and theoretical roots of ACT, ACT intervention components and techniques as they apply to smoking cessation, and preliminary clinical data on the relative efficacy of ACT for smoking abstinence in comparisons with empirically supported treatments (ESTs) for smoking cessation.

5.5. ACT’S PHILOSOPHICAL ROOTS

ACT is based on the pragmatic philosophy of functional contextualism (Hayes, 1993; Biglan & Hayes, 1996). The core analytic unit of contextualism, or pragmatism, is the ‘ongoing act in context’, which is both historically and situationally defined. Functional contextualism as a philosophy of science is radically different to the mechanistic realism which underlies most cognitive and cognitive-behavioural therapies. Contextualists make no assumptions about the nature of reality, and instead are concerned only with ‘successful working’. In contextualism, a theory or analysis of a problem is valuable to the extent that it

achieves specific, measurable, valued goals, which makes any discussion of an ontological reality irrelevant. There is no real world to consider apart from that in which the observer participates. The only truth that matters is what works for an individual in the moment. One individual's truth may not be another's truth, and what works for an individual in one moment may not work one moment later, which, by definition, means that it is possible to resolve a problem with multiple and even contradictory truths. Hayes (2008a: 291) usefully sums up the absurdity of a truth of psychological science in his note, "in the history of science, all theories are ultimately shown to be incorrect. So far, this is without exception, and there is no reason to suppose that will be different in the future". Functional contextualism is therefore concerned with generating "rules for people, not rules for the world" (Hayes et al., 1999: 23).

Knowing what works requires only that therapists and clients specify beforehand what clients are working towards, and the utility of the therapy is measured by the extent to which clients achieve their chosen goals. The pragmatic goal also dictates that any way of speaking to clients that helps them to achieve their specific goal – even if is "scientifically wrong" – is valuable. For this reason, ACT therapists are less interested in organising clients' thoughts, feelings, and behaviours into syndromal classes, but instead focus on uncovering the contexts currently preventing the client from taking effective action.

One of the main differences between the contextualist and cognitivist paradigm concerns the meaning of clients' behaviour attributions. The ACT therapist compassionately accepts no attribution as literally true, no matter its reasonableness. The issue is not its reasonableness, but whether it is functionally useful for achieving their therapy goals. What the client says he is feeling, thinking, worrying about, remembering or otherwise experiencing is not assumed to be the key problem even though clients will contend that

distressing thoughts and emotions are precisely their problems, and precisely why they sought help. When clients attribute their behaviour to having an excess of a particular thought (e.g. "I smoke *because* I worry about work"), the key questions become: "what is the function of the client's account?", "what conditions are supporting the client to give reasons for his behaviour?", and, "what factors are supporting the client to causally link thoughts with unwanted behaviours?" The important question is *not* "is this account true or false?" Repeatedly asking "why" questions in response to any answer that the client gives can be a useful way of quickly getting to the bottom of clients' reasons for reason-giving. According to Forsyth, Chase, and Hackbert (1997), cognitivists' lack of interest in the functions and origins of attributions represent their most serious impediment to understanding their clients' behaviour and their greatest missed opportunity to break harmful cycles of cognitive fusion and experiential avoidance.

5.5.1. Prediction and Influence as the Goals of Functional Contextual Therapies

The goals of functional contextualism are the successful prediction and influence of observable behaviour, with the influence goal being most emphasised. Contextualism rejects CBT's assumption that thoughts and feelings directly cause overt behaviour. In contextualism, thoughts and feelings are not assumed to cause overt behaviour, including language, except as mediated by environmental contexts which link these internal experiences to overt behaviour. That is, thoughts in themselves are not sufficient causes of behaviour, but can become sufficient causes when regulated by contexts in which they function as literal causes of behaviour. Eliminating problem behaviour should, therefore,

begin by identifying the environmental and social-verbal contexts in which the problem behaviour surfaced and proceed to a consideration of how these contexts can be altered.

Contrary to the cognitivist position, ACT treats the environmental context as the independent variable influencing behaviour, including language and cognition, as the dependent variable for two reasons. First, the environment is external to individual who is emitting the behaviour of interest; in contextualism, only changes occurring outside the individual are presumed able to effect change upon the individual. Second, to manipulate a client's cognition, one must manipulate the conditions which gave rise to the cognition – it is not possible to manipulate a cognition directly in the way that the observable environment can be directly manipulated, far less prove that a thought can be manipulated apart from other cognitive and environmental manipulations which could just as well cause the behaviour change of interest. B. F. Skinner once wrote that "in practice, all these ways of changing a man's mind reduce to manipulating his environment, verbal or otherwise (Skinner, 1969: 239). In the same vein, Follette and Houts (1992) argue that "cognitive behaviourists, unless they have found the cognition 'fine-tuning' knob, are, by virtue of their talk, assigned homework, and contingent approval, altering not the cognition directly, but the conditions which give rise to it (p256). Environmental manipulations, in turn, produce behaviour changes that directly correspond to what was changed in the environment. Thus, the contextualist shift back towards focussing on controlling events in the observable environment, in theory, facilitates both the goal of predicting how people will think and behave following an environmental manipulation *and* the goal of influencing the regulatory functions of private behaviour (cognition and language), overt behaviour, and cognition-behaviour relations. As such, ACT is most concerned with understanding how the functional relations between the environmental context and cognitions and the functional relations

between cognitions and behaviour become established so that the environmental context comes to regulate cognition-behaviour relations.

5.6. ACT'S THEORETICAL ROOTS

ACT is based on a comprehensive contextual behavioural theory of language and cognition known as *Relational Frame Theory* (RFT; Hayes, Barnes-Holmes, & Roche, 2001). Penned simply because no existing theory adequately accounted for the roles of language and cognition in human behaviour, RFT is essentially a theory of how relational learning comes to dominate over direct contingencies to influence human behaviour. For example, the main criticism levelled at Skinnerian behaviourist theories has been their failure to provide an adequate explanation for the complexity and generativity of human language and cognition (Barnes-Holmes, O'Hora, Roche, Hayes et al., 2001). According to RFT, explanations of human behaviour which centred on the same simple associative behaviours shown by rats and pigeons missed the essence of human symbolic behaviour – the act of labelling our thoughts and feelings. As a consequence, 'first wave' behaviourists denied a central role to the verbal qualities of cognition and emotion in their study of behaviour. RFT provides an explanation of human behaviour which extends beyond a Skinnerian analysis of immediate behavioural contingencies, and indeed, beyond its technical application in ACT. Accompanied by a rapidly expanding literature on the influence of derived stimulus relations over behaviour, RFT calls for a re-interpretation of psychopathology as complex functional verbal behaviour.

According to RFT, the most basic difference between verbal and nonverbal organisms is the ability of verbal organisms to derive stimulus relations bidirectionally (Barnes-Holmes,

Barnes-Holmes, McHugh and Hayes, 2004). Consider the classic example of Pavlov's dog. The dog first salivated at the sight of food; sight of food-receive food is the first stimulus relation. After repeated pairings of ringing a bell before presenting food, the learned relation between the previously neutral bell ring and food meant that the bell ring alone became sufficient to cue salivation; bell-salivation is the second stimulus relation. Now consider what would happen if the bell ring was presented *after* the dog had finished eating the food. The dog would likely not salivate because while animals are typically quick to derive stimulus relations between neutral events that *predict* the onset of more important psychological or behavioural experiences, they are typically far slower to derive stimulus relations between neutral events that *follow* important experiences (Hall, 1984).

Humans, by contrast, are very quick to establish stimulus relations between neutral events which follow important experiences (Barnes-Holmes et al., 2004). Consider the example of a child who is bitten by a dog and then afterwards is told that the dog is called a "Rottweiler". At some point in the future, the question "Have you ever seen a Rottweiler?" should elicit a fearful response from the child who will perhaps find it distressing to talk about the only time a Rottweiler had been encountered. For this child, the sound of the word "Rottweiler" alone becomes a sufficient stimulus to re-experience the thoughts and feelings which emerged during the Rottweiler attack, even though the word "Rottweiler" has never predicted being bitten by a Rottweiler. In more abstract terms, the child derives both the event-label relation and the label-event relation whereas Pavlov's dog derives only the bell-event relation. The process by which the child comes to fear the word "Rottweiler" is not due to simple stimulus generalisation, because there is no direct link between the formal properties of the verbal label and the fearful response to the label; the verbal label and the fearful reaction are linked by their membership in the same verbal class. According to RFT,

the bidirectionality of stimulus relations is a defining feature of human language and cognition, and one which has important implications for establishing and altering human behaviour.

RFT begins with the well-established fact that verbal and nonverbal organisms quickly derive relations between stimuli based on their formal properties. For example, an ocean contains more water than a lake; the winter is colder than the summer. Relationships between the formal stimulus properties of size, speed, height, weight, temperature and so on are nonarbitrary; they are universally applicable. However, in certain contexts and with sufficient exemplar training, humans also arbitrarily relate stimuli as if they are actually related in some way. In other words, stimulus relations may be defined and mediated by contextual cues that are based on arbitrary social-verbal conventions rather than a formal stimulus property (Barnes-Holmes et al., 2004). Consider the example of a smoker who states; "I smoke *because* I am stressed". In this case the derived relation between stress and smoking comes under the contextual control of the term "because" rather than a formal stimulus property shared by stress and smoking. The relational term "because" tells the therapist that the person understands his behaviour as the mechanical effect of a cause, which mutually entails a derived relation between the absence of the cause and the absence of the effect, and thus, an idea for a logical, verbally-guided solution to quitting smoking – remove the cause to remove the effect. The term "because" indicates that the smoker has related stress to smoking as its literal antecedent – smoking happens when stress happens. From an RFT perspective, this is an example of arbitrary relational responding because smoking appears to be occurring as a function of smoking yet no literal causal links exist between the nonarbitrary properties of stress and smoking. It is presumed that millions of people do not report that feelings of stress initiate smoking behaviour because the contexts in which 'stress'

and ‘smoking’ participate do not support such a relation in these individuals. Those who do report a causal link are reporting that affect regulation has become an important learned function of smoking, not a mechanical cause of smoking.

From an RFT/ACT perspective, uncovering the contexts which strengthen an understanding of the relation between stress and smoking as one of cause-and-effect can suggest avenues for weakening the client’s belief that his experience of stress is literally compelling him to smoke as a way to cope with stress, and in turn, weakening his belief in the need to develop behavioural skills which apparently alleviate stress. In many cases, the social-verbal contexts of generating reasons for behaviour and viewing bad private events as good causes of bad behaviour are likely to be major sources of support for deriving arbitrary cause-and-effect relations (Hayes et al., 1999). This approach is entirely different to that of the CBST therapist who would typically attempt to identify the situations which are causing the client to smoke so as to make plans to avoid and change them, an approach which actually strengthens the dominance of the literal, evaluative functions of stress over those based in experience.

Given the appropriate contextual cues, the derived ‘stress-smoking’ relation can be arbitrarily applied to a wide range of other stimuli which can then be organised into a relational network. For example, if the person believes that “stress causes smoking”, and “taking the bus to work is more stressful than driving to work”, this entails the derived relation that “I will be more likely to smoke if I take the bus”. For as long as this verbal rule dominates over direct experience with the referents of this rule, this person will seek to avoid taking the bus to work, and for that matter, other situations which occasion stress.

The various patterns of contextually-mediated and arbitrarily applicable relational responding, such as the “bus → stress → smoking” relation described above, are referred to

in RFT as *relational frames*. (Hayes et al., 2001) A relational frame has three defining features. The first, mutual entailment, describes the relations between two stimuli. If an individual knows that place A is more dangerous than place B, this relation mutually entails that place B is safer than place A. The second, combinatorial entailment, describes the relations between three or more stimuli. If an individual learns that place A is more dangerous than place B and place B is more dangerous than place C, he learns that place A must be more dangerous than place C. Relating combinations of stimuli in a bidirectional fashion enables the third feature of a relational frame, the transformation of stimulus functions. An individual who is mugged at place C and then learns that place B is more dangerous will show a greater emotional response when walking through place B than they did at place C to the extent that the contextual features mediating the B-C relation are salient in attention, even though place C was directly paired with mugging. The overarching benefit of these three features of a relational frame is that if humans are trained two out of three stimulus relations in one direction (e.g. A is more than B and B more than C), they can quickly learn all six bidirectional relations in which A, B, and C participate without needing to experience more than the initial two relations.

Once we learn how to derive arbitrary verbal relations, we do so constantly throughout our lives because most of our world is verbal and because succeeding in the social-verbal community requires that we explain and order our world in verbal terms. Starting with only a dozen unidirectional arbitrary relations, humans can quickly derive hundreds of bidirectional relations. In the process of creating a verbal world, overt behaviour tends to become increasingly governed by verbal rules and evaluations at the expense of directly experiencing environmental contingencies that are available in the present moment (Hayes et al., 1999). Once established, verbal rules tend to be applied rigidly to learning new

stimuli and can be extremely difficult to break, even when direct contact with the environment provides no reinforcement or reinforcement for abandoning a rule. Rule-governed behaviour also appears to require only minimal contextual cuing for reinstatement, even long after new verbal rules have been learned in their place.

Expanding our derived relational network allows humans to become better able to predict uncertain futures, match patterns, communicate ideas, build relationships, negotiate deals, and influence others to behave in desirable ways. In this sense, the verbal knowledge which gives rise to all human achievement is rooted in the everyday language processes of deriving arbitrary verbal relations. According to RFT, however, the same bidirectional quality of language which makes verbal knowledge useful also makes verbal knowledge potentially adverse and actively resisted when we become aware we are thinking and feeling in undesirable ways (Hayes et al., 1999; Barnes-Holmes et al., 2004).

5.6.1. Cognitive Fusion Rationalises Experiential Avoidance

If relational learning was only unidirectional, then talking about smoking, for example, should not elicit the same emotional reactions and subjective craving that were experienced during periods of nicotine withdrawal, because the words that are used to describe withdrawal effects have only followed the withdrawal effects. The bidirectional relational frame becomes relevant to the treatment of addictive smoking when the words we use to describe past adverse experiences come to acquire some of the adverseness of the experiences they are being used to describe, such that reading, speaking, or hearing these words hereafter function somewhat as conditioned stimuli for the same adverse experiences

that were elicited during or following the initial event. When the aversive emotional properties of an event fuse with the verbal labels we give to the events, and these labels are treated as if they literally *are* the adverse experiences themselves, thinking of these verbal labels can be experientially difficult to the extent that attempting to suppress thoughts and emotions that are so labelled seems a logical response. This cognitive fusion, defined as "the excessive and improper regulation of behaviour by verbal processes, such as rules and derived relational networks" (Hayes et al., 2006: 7), appears to be the reason why awareness of adverse verbal knowledge is experientially unpleasant, and by extension, why people make unnecessary attempts to avoid unpleasant verbal knowledge and the situations which occasion such knowledge. This also means that the desire to avoid unpleasant private experiences is a built-in, contextually controlled consequence of normal human language processes. In this sense, smoking to alleviate negative affect and physical constituents of the nicotine withdrawal syndrome may be usefully conceptualised as maladaptive rule-governed behaviour. The contexts which support maladaptive verbal rules are therefore of great interest to the therapist.

Because of derived stimulus relations and transformation of stimulus functions, the literal, evaluative functions of language tend to dominate our thinking, such that thoughts and emotions often function as if they are what they say they are – literal reflections of a private ontological reality – rather than what they actually are – bits of language that have been arbitrarily applied to certain stimuli in certain contexts. For example, in most circumstances, anxiety is evaluated as a 'bad' or 'negative' emotion, and negative emotions are generally avoided. Results from priming and 'mere exposure' experiments suggest that people immediately and without conscious awareness give priority to evaluating the affective properties of a stimulus as 'good' or 'bad' (e.g. Bargh & Chartrand, 1999). Evaluating an

emotional state as ‘good’ or ‘bad’ alters the function of the emotion and the verbal content to which it relates such that the arbitrary evaluation of the emotion comes to look like a literal description. When this occurs, ‘anxiety’ is no longer viewed as just an emotion that the person has evaluated as ‘bad’; it now *is* a ‘bad’ emotion as if ‘badness’ is an inherent property of the emotion of anxiety. The result is that the individual becomes what he feels, an anxious person, rather than what is actually the case, a person who is having the feeling of being anxious. The word ‘anxiety’ takes on a literal meaning such that the reading, speaking, or hearing of the word brings into awareness the (typically negative) verbal classes to which the word ‘anxiety’ is related (e.g. stress, worry, frustration). Anxiety, the word, fuses with anxiety, the experience, to become anxiety, the literal truth about one’s self. Believing in the literality of anxiety as a ‘bad’ emotion provides a rationale for its avoidance and the situations which occasion it.

5.6.2. The Process of Avoidance Necessarily Contradicts the Goal of Avoidance

RFT suggests several routes by which cognitive fusion may actually increase the difficulty of quitting smoking, and more specifically, why the suppression of thoughts and emotions relevant to smoking can lead paradoxically to smoking behaviour in order to cope with these thoughts and emotions. For one, RFT suggests that, “a direct, literal verbal solution to the problems of excessive verbal control could not work because direct, literal, verbal solutions were the very problem we were trying to undermine” (Hayes et al., 1999: 36). RFT views the paradoxical effects of thought suppression as borne from a conjunction of cognition and metacognition precisely when we need the two to split. As described in an

earlier section, all mental control proceeds in one of two ways: primary concentration on thought ‘A’ and auxiliary suppression of thoughts that are not ‘A’, or primary suppression of thought ‘A’ and auxiliary concentration on thoughts that are not ‘A’. Herein lays the paradox of primary thought suppression: the process of suppressing verbal content requires that we hold on to the verbal content we wish to suppress for as long as we wish to suppress it!

The intention to suppress a thought requires that we formulate a verbal plan expressing this intention (e.g. “I must not think about smoking”). This verbal plan necessarily contains the thought (smoking) we don’t want to engage, meaning we cannot engage the meta-thought “I must stop thinking about smoking” without engaging the thought “smoking”. Thus, we arrive at a logical impasse: (1) in order for thought suppression to work, we must suppress all traces of that thought, including the plan to suppress it; (2) but if we suppress the plan to suppress thoughts then we cannot know what thoughts we are meant to be suppressing or that we had planned to suppress them; (3) on the other hand, remaining conscious of the plan to suppress thoughts necessitates that we remain conscious of the thoughts to which the plan refers. It is for these same reasons that we can never know whether our suppression efforts are having the desired effect because to ask “is this working?” necessitates that we remind ourselves of the thought that we are meant to be suppressing. In other words, suppression can only work when it is not important to us that it does work, which is rarely the case because for as long as a state of ‘not thinking’ is important to us, the desire to monitor whether suppression is succeeding will persist.

Thus, the process of suppressing a thought necessarily contradicts the goal of not having the thought. Ultimately, “consciousness cannot produce a negation, except in the form of a consciousness of negation” (Sartre, 1956: 43), and in this way, to use quitting drinking as an example, “the hard drinker who keeps thinking of not drinking is doing what he can to

initiate the acts which lead to drinking. He is starting with a stimulus to his habit" (Dewey, 1922: 34-35). From the RFT perspective, thought suppression, is rigged against the quitting smoker; it gives the illusion of being a solution and then inflicts the very problem which it had promised to resolve.

5.6.3. Distraction Can Only Work for as Long as We Don't Check that it is Working

It is difficult to suppress an unwanted thought when we don't specify what should be thought in place of the unwanted thought. The purpose of engaging in distracting activities is to support the suppression of unwanted thought A by concentrating on thoughts which are not thought A, and ideally, as quite unrelated to thought A. However, our attempts to be distracted from thought A are also undone by our desire to know if these attempts are having the desired effect. Imagine an individual who stubs his toe on the leg of an oak table. He immediately tries to block out thoughts of the pain by looking around the room for other things to think about. The first problem is that there will be few thoughts or environmental stimuli at that moment that are sufficiently absorbing to distract his attention away from the pain. But let us imagine that he is successful in finding a thought, perhaps making a shopping list, which keeps him from thinking about the pain. Thinking about the shopping list will only work as a distraction for as long as the individual doesn't question whether the attempt at distraction is succeeding, which at some point he must. To check that the distraction is working the individual must remind himself what he is seeking distraction from, at which point his attention shifts back to the pain in his toe.

In short, a motivational paradox emerges in which a distraction can only work for as long as it is not important that it does work. But the very reason for seeking distraction is that we don't want to concentrate on something else, and so paradoxically, distraction is less likely to work for those who give greater effort to making it work, and unfortunately, to checking that it works. The individual can only hope that the pain subsides before he asks the question.

5.7. Implications of Relational Frame Theory for Initiating and Maintaining Smoking Abstinence

In RFT/ACT, no cognition or emotion is considered 'faulty' or 'disordered' because positively and negatively evaluated cognitions derive from the same everyday language processes which support essential everyday cognitive abilities like verbal problem solving and reasoning. By implication, no individual is assumed to be 'broken' per se, meaning there is no need for a therapist to try to 'fix' his/her clients. The presence of negative affect, nicotine cravings, poor outcome expectancies, or any other cognitive or emotional construct to which the client attributes a relapse are not assumed to be the causal determinants of the client's ability to quit smoking; rather, difficulties in quitting smoking are presumed to stem from the human tendency to evaluate private experiences as 'good' or 'bad', fuse with the literal truth of these evaluative labels, and in turn, engage in excessive, inflexible avoidance behaviours which are tightly linked to a rapid and efficient amelioration of these 'bad' private events, even when these prove to be counter-productive. Therefore, the ways in which clients

respond to and interact with what they are thinking and feeling is of greater interest to the ACT therapist than what they claim to be experiencing.

Thus, from the ACT/RFT treatment perspective, efforts to avoid, alter, and substitute the antecedents of smoking are neither practical nor necessary for quitting smoking because the transformation of stimulus functions occurs under contextual control and these efforts do not alter the contexts which increase the functional importance of avoiding exposure to derived 'causal' stimuli. Dramatic behaviour change is possible, however, by detecting and altering the contexts in which the negative, 'triggering' functions of thoughts, feelings, and situations are established. Contexts which support the literal, evaluative functions of the verbal content of cognitions to dominate as a source of influence over behaviour are those which support: a literal interpretation of cognitive and emotional content (i.e. when words are treated as literal reflections of their referents, for example, making the statement "this *is* an anxious thought" rather than "this is a thought which I have labelled as 'anxious'"); reason giving for behaviour; a view of private events as good causal antecedents of behaviour; and a view of experiential control as the key to behavioural control (Hayes et al., 1999). By developing clients' understanding of the role of these social-verbal contexts in regulating their interpretations of internal and external events as smoking 'triggers', smokers can learn to see private experiences for what they really are, behaviours in themselves (in that they are learned responses to arbitrarily derived verbal relations), rather than what they appear to be, causes of behaviour.

5.8. ACT FOR SMOKING CESSATION

ACT intervention techniques are linked point-to-point to the basic principles of RFT. The fundamental message implicit to each ACT technique is that the client does not need to get rid of any particular thought, emotion or other private experience for positive behaviour change to occur. The focus is always kept on the workability of clients' responses to the symptoms they claim to be experiencing, and accordingly, ACT techniques emphasise the functional importance of changing the nature of the client's relationship with the things which he/she calls 'symptoms'. This view assumes that changing the contexts in which certain private experiences have been learned as 'problematic' should better enable clients to show values-consistent behaviour in the here and now than would changing what clients claim to be experiencing. Broadly, ACT as a behavioural approach to smoking cessation rationalises and teaches acceptance-based responding to smoking-related stimuli as a method to increase values-based action, weakens the social-verbal contexts in which the 'smoking trigger' functions of stimuli dominate, and in their place establishes different verbal contexts which support clients to behave in ways that are consistent with their long-term goal of becoming an ex-smoker while remaining in contact with the affective and physical experiences which tend to accompany nicotine withdrawal and habit reversal.

5.8.1. Metaphors, Paradoxes, and Experiential Exercises in ACT

The ACT therapist cares about what the client wants, but does not believe that successful working can come from a logical, literal analysis of the client's problems. ACT aims to break the clients' cycles of cognitive fusion by demonstrating the non-linearity of language through metaphors, paradoxes, experiential exercises, imagery, stories, allegories,

humour, and surrealism. These techniques appeal to a client's direct experience of his thoughts and emotions; logical analysis of the client's problems is kept to a minimum.

Metaphors are useful because, though verbal, their impact is largely experiential in that they give the client a sense of the workability of a solution in a metaphorical situation, and how the metaphorical situation resembles the situation in which the client is currently struggling. This experiential insight is useful because the purpose of ACT is to have clients make contact with immediate environmental contingencies and base their behavioural decisions on what their experience tells them is working, not on what the mind tells them should work. Metaphors create a context in which clients begin to question the value of persisting with behaviours which only work in theory, and in which directly experienced contingencies become more valued sources of information.

Raising clients' awareness of the paradoxes which they have worked themselves into is also a useful technique. The inherent paradoxes on which ACT are based are that, in certain contexts, efforts to avoid adverse private experiences tends to make these experiences arise more frequently and intensely, and that abandoning efforts to avoid these experiences can be the change which stops the adverse functions of these experiences. The experiential impact of pointing out to clients when they are behaving in a paradoxical fashion – when their logic dictated that one thing should happen but their experience tells them that the opposite thing has actually happened – increases the distinction between the literal and functional properties of verbal content and helps clients to realise that literal language can be helpful in some contexts but counter-productive in others.

ACT also relies heavily on encouraging clients to directly and gradually experience the excess of negatively evaluated thoughts, memories, and images and so on that are held up as their reasons for coming to therapy. Experiencing previously avoided content gradually in

a non-judgemental way creates a safer context in which the client can become acquainted with the nature of his avoided experiences. This gradual exposure is predicted to reduce the adverse functions of these experiences, weaken the rationale for responding with avoidance, and establish a context in which the client values what experience suggests does and does not work over what logic dictates should and should not work. By encouraging the client to observe and describe what they are experiencing when they contact feared verbal content but without evaluating this content as 'good' or 'bad', metaphors, paradoxes, and experiential exercises in ACT are used to loosen the grip of the literal, evaluative properties of language-based cognition over behaviour in a way that a linear, analytic, proscriptive discussion of these cognitions cannot.

5.9. STANDARD COMPONENTS OF ACT FOR SMOKING CESSATION

A smoking-focussed ACT intervention may typically be organised around ten therapeutic elements: (i) help clients to identify valued life goals and perceived barriers to living out one's values; (ii) draw out what the client has tried so far to quit smoking; (iii) draw out what the client has been trying to avoid and control; (iv) examine the workability of all quit strategies tried so far; (v) discuss the possibility that avoidance and control strategies have increased rather than decreased the difficulty of quitting smoking and consider what it might feel like to let go of these strategies; (vi) introduce the idea of acceptance of smoking cues as an alternative to avoidance and discuss what acceptance might be like; (vii) practice acceptance of previously avoided private experiences and external events; (viii) detect and weaken the verbal rules which support the participant to fuse with his/her private

experiences; (ix) practice acceptance and defusion skills in therapeutic exposure and activation of smoking-relevant private events; (x) plan and commit to showing values-consistent behaviour in the presence of previously avoided 'trigger' stimuli. The sequence in which these core elements are addressed should vary depending on the specific circumstances of clients, but should in all cases overlap and intertwine throughout ACT.

5.9.1. Draw out the System

ACT assumes that the difficult and adverse private experiences which accompany smoking cessation and the client's avoidance of these experiences are part of the reason why the client has not yet managed to quit smoking. The therapist may begin by asking the client, "with what are you struggling?", "what do you want to get out of coming here/what brings you to therapy?" and "what have you done to try to solve this problem?" Treatment-seeking smokers overwhelmingly tend to attribute past relapses to having too much of a 'bad' private event (e.g. stress, sadness, craving) and/or not enough of a 'good' private event (e.g. motivation, expectancy of success). Though they have not yet managed to quit smoking, clients tend to be pretty sure that the solution involves accepting only the good private events and avoiding the bad private events. This leads to the dominance of the verbal rule "bad private events cause me to smoke. Stopping smoking requires that these 'causes' be controlled" over behaviour. When this rule dominates, clients tend to report having struggled in various ways to control a long list of negatively evaluated private events. Strategies will typically include trying not to think about smoking (i.e. active thought suppression), seeking mental and behavioural distractions, relaxation, avoiding people and places associated with smoking, not carrying cigarettes or money around, and seeking experiential control through

other psychoactive substances, among others. The therapist will try hard to extract all the strategies which the client has used, no matter how insignificant the client believes them to be, in order to fully understand what verbal rules have been supporting the client's maladaptive responses to private experiences.

5.9.2. Examine the Workability of Previous Quit Strategies

To the goal of pragmatic working, the ACT therapist is concerned with what hasn't worked for a client in the belief that this information will give an insight as to what is going wrong and what might work instead. In other words, the ACT therapist will approach a client's problem with the assumption that "what the client has been trying to do to solve the problem is itself part of the problem" (Hayes et al., 1999: 92). The therapist may begin by asking the client how well past quitting strategies have worked, a deliberately rhetorical question given that the client has sought help to quit because he has not managed to do so on his own; had these strategies worked, the client would not be here now. Clients know that what they have been doing hasn't worked, and in discussing what has been tried and failed, several things become clear to the client: he has tried many things, perhaps everything that seemed logical and reasonable to try, but the problem remains. The fact that he has exhausted a list of different strategies and the fact that he has now come to therapy for help suggests that his problem is not one of motivation; on the contrary, he has worked hard to solve the problem, but working hard somehow seems to have made the problem worse. The difficulty of quitting smoking does not seem to be like solving problems in other areas of life; there seems to be something inherently paradoxical about working hard to control one's smoking. Whereas the client's mind may tell him/her that finding ways to reduce exposure to stimuli

which increase urges to smoke should make abstinence from smoking more tolerable, experience is telling him/her that his efforts to control these experiences have actually made abstinence from smoking less tolerable. The ACT therapist would add to this experiential feedback by suggesting that the client's experiences may be valid and that the social message they had been given about the need to control adverse private events may be incorrect; perhaps control strategies *cannot* work.

It is important, however, that the therapist does not demand that clients evaluate their change strategies as unworkable; rather the therapist's duty is to point out that 'mind' and 'experience' are in conflict, and to weaken the client's reliance on ineffective verbal rules so that the wisdom of directly experienced outcomes can play a greater role in shaping behaviour. When the client acknowledges the possibility that he may be caught in a self-defeating struggle to control the private experiences which he has linked to smoking, the therapist can begin to foster a sense of creative hopelessness about where the therapist and client can go from here.

5.9.3. Engender a Sense of 'Creative Hopelessness'

A typical client reaction at this point may be: "OK, so what do I do now?" Hayes et al. (1999) suggest a good response to this would be a variant of: "I don't know, but the first step is to acknowledge that what you are doing isn't working". Several metaphors can be used here to illustrate instances in which an individual puts a lot of effort into solving a problem only for his problem to worsen. The *Person in the Hole* metaphor (Hayes et al., 1999: 101-102), for example, aptly captures the essence of the difficulties faced by quitting

smokers. The metaphor describes a man who falls into a hole with only a shovel to dig himself out. As he becomes more and more desperate to get out of the hole, he digs faster and faster and finds himself deeper in the hole as a result. The quitting smoker may be asked to consider that he too has been stuck in a hole of sorts for some time, that he has tried every logical way he can think to get out of this 'hole', and that he has used all the 'tools' at his disposal to dig himself out but remains deep in this hole today. Logic tells the man in the hole that digging should eventually be the solution, while at the same time his experience tells him that digging itself is the problem. A useful first step for both the man in hole and the quitting smoker would be to acknowledge that what they have been doing hasn't worked and to 'drop the shovel', even if they don't know what to do next. At this moment, all the quitting smoker can be sure of is that continuing to dig is not the answer. Several variations on the *Person in the Hole* metaphor which are also helpful for drawing attention to the workability of current behaviour, engendering creative hopelessness, and clarifying a valued life direction are described in Hayes et al. (1999). The core lesson of these metaphors is that only when the client is willing to let go of a self-defeating struggle can he begin to consider a different approach.

Whereas hopelessness normally means despair, clients are told that 'creative hopelessness' means giving up on what experience is telling the client is futile and seeing this discovery as an opportunity to try something different. The therapist makes clear that creative hopelessness does not mean that the client is hopeless; it means that what he has been doing is hopeless, but he can change what he does. Engendering creative hopelessness is therefore an empowering process. Acknowledging that the current way of looking at the problem isn't workable becomes the basis from which the client's first fundamental change in ACT occurs: weakening the verbal rules which drive the unworkable control agenda and replacing them

with contingencies based in actual experience. The therapist may end this phase by explicitly introducing the idea that has been emerging up until now: trying to control what is experienced during smoking abstinence may be part of the problem, not the solution.

5.9.4. Avoidance is the Problem, Not the Solution

Since most of the ineffective strategies reported by quitting smokers are essentially attempts to avoid, eliminate, reduce, or change what is privately experienced during smoking abstinence, the therapist asks the client to consider that the problem may be one of control. This phase of ACT aims to undermine quitting smokers' confidence in the rationale for control-based quitting strategies by exposing them to the range of problems that arise when they try to control adverse private events, and begins to suggest that relinquishing control and instead be willing to experience adverse private events may be a more functional alternative.

The incentive value of controlling private events can be reduced by explaining how experiential avoidance cannot work because the verbal plan to avoid specific smoking thoughts and emotions necessarily containing the thoughts and emotions that are to be avoided; by explaining how distraction from smoking thoughts only works for as long as we don't check that it is working; by discussing how avoidance of problem private events is difficult because the verbal labels which we attach to these events become inextricably verbally linked to a range of other stimuli, and their positive and negative functions, that are ubiquitous in daily life; by discussing how successful avoidance of smoking stimuli tends to come at the cost of withdrawing from other activities, situations, and relationships we value

in life (i.e. even when avoidance works, it doesn't really work!); and by explaining how control strategies tend to work in the short-term but fail in the long-term.

The unworkability of control strategies can be equally well illustrated through simple but profound quotes – for example, "rowing harder doesn't help if the boat is headed in the wrong direction" – as it can through elaborate stories. *The Harvey Milk Story*, for example, illustrates to clients how seeking to avoid unpleasant emotions and physical reminders of these emotions can be an impractical, exhausting, and life-limiting problem-solving strategy because to successfully avoid or escape an unpleasant emotion necessitates that we also successfully avoid the plethora of stimuli to which the unpleasant emotion is verbally related. Alternatively, this story suggests that a more workable solution would be to accept perfectly normal but unpleasant emotions and their physical relations which cannot be changed while continuing to live in line with his peaceful values. *The Harvey Milk Story* describes a time when Milk, the first openly gay person to be elected to public office in the State of California, found a threatening letter addressed to him in his kitchen drawer. This letter had been hidden there a few days prior by Milk's boyfriend. When Milk found the letter, his boyfriend said to put it back in the drawer and try to forget about it. Milk told him that it was impossible to forget that the letter, and its hateful content, exists because in order to forget about the letter he would have to forget about the drawer in which it was hidden, the table next to the drawer, the kitchen which contained the table, the house which contained the kitchen and so on until the mere thought of coming home from work would remind him of the hateful letter. Milk saw that it was not possible to change or escape the fact that some people didn't like him because he was gay. Instead, Milk accepted this fact and posted the letter up on the refrigerator door so that he could see whenever he was in the kitchen. By doing so, Milk quickly found that by not objecting to the letter's presence, it quickly became 'part of the

wallpaper' (i.e. it stopped being noticeable). Milk not only realised the futility of attempts to avoid the letter, but more importantly, he realised that he was able to keep moving forward with his life while accepting the pain that inevitably came with it.

The Harvey Milk Story suggests that while it is understandable that quitting smokers' do not want to experience any of the physical and emotional distress which typically accompanies smoking cessation, avoiding a distressing withdrawal experience is extremely difficult because there are so many reminders of smoking in their daily lives, and it would be impractical and life-limiting to withdraw from valued activities in service of avoidance of smoking stimuli. Instead, letting go of their struggle to control the difficult internal experiences which typically accompany nicotine withdrawal, and beginning to embrace these experiences as an inevitable part of a valued life change, though initially difficult, should gradually reduce the negative impact of these private events and in turn increase individuals' willingness to sit with these private events without feeling the need to smoke to alleviate them.

The *Polygraph* metaphor (Hayes et al., 1999: 123) can also usefully illustrate that persistent attempts to control a perfectly natural emotional reaction can paradoxically amplify the very emotional reaction that was to be controlled. As much of the emotional and physical discomfort which accompanies nicotine withdrawal is a natural, inevitable response to a changing private pharmacological environment, the *Polygraph* metaphor nicely illustrates how people often try to control what is uncontrollable, prevent what is inevitable, and stop what is automatic, only to make the problem worse.

This phase ends by suggesting that the client does not need to get rid of difficult private events in order to quit smoking, and the therapist and client begin to discuss what it might be like to be willing to experience all the thoughts, feelings, and physical sensations

that come with quitting smoking, and the status quo, what it might be like to continue to be unwilling to experience these private events. This opens the client up to the possibility that, contrary to what they have been taught by friends and family, valued living may be found in relinquishing control of his thoughts and feelings, not in their mastery. Again, the ACT therapist must not insist to the client that willingness to experience *is* a good alternative to avoidance; if the client is to come to this conclusion, he must come to it by reflecting upon the lessons of his own experiences and be willing to try something different.

5.9.5. Willingness to Experience as a Healthy Alternative to Avoidance

Once clients' attachment to controlling adverse private events has been weakened, the therapist can foster a willingness to experience previously avoided internal smoking cues. The idea that deliberately thinking about our most feared thoughts should be good for us may be confusing initially. It may seem like the therapist is prescribing the poison as the antidote for itself, and suggesting that clients throw away what they had long believed to be the antidote. By letting go of the struggle to control private events, however, clients can no longer worry about worry, be anxious about anxiety, panic that unwanted thoughts might intrude, or be frustrated by failure to control cravings. Persuading clients to abandon their unworkable agenda may not be easy because many will likely have spent the past months or years working to reduce the negative impact of private events, and they will likely bring with them to therapy a strong resistance to these experiences, resistance to the idea that control cannot work, and resistance to the therapeutic suggestion to try something different. Being willing to experience all private events as they are may be the last thing these clients want to do and the last thing they think should work. Accepting this therapeutic suggestion will likely

require encouragement and practice, but by doing so, it is predicted that clients cannot continue in their usual self-defeating ways.

The therapist should first explain what willingness is. The term ‘willingness to experience’ may be introduced at this point rather than ‘acceptance’ because ‘acceptance’ tends to connote that bad feelings must be tolerated, or that clients should just give up. Letting go of the struggle to avoid thinking or feeling in a specific way seems to require a deeper understanding of the nature of language of cognition than is taught by everyday experience because letting go of this struggle, on its surface, seems to be inconsistent with the goal of ‘feeling better’. Being “willing to experience” should be explained to clients as embracing, holding, and compassionately accepting their thoughts and feelings completely, for what they are in the moment, fully and without defence. “Fully” means that clients are encouraged to experience all thoughts and feelings, not just some thoughts and feelings and not just specifically the ones they like. “Without defence” means non-judgmental, non-evaluative awareness, to feel feelings without giving them a name or judging their ‘goodness’ or ‘badness’ – just feeling them much as clients might reach out and feel the texture of the table. Pointing out to clients that coming to therapy, talking about difficult topics, and being open to trying something different as they try to quit smoking represent their first acts of willingness can be a nice way of introducing what it feels like to be willing.

Once explained, the client is helped to practice being willing. The *Quicksand* metaphor (Luoma, Hayes & Walser, 2007: 37-38) offers a useful way of showing how being willing to experience distressing situations may better facilitate quitting smoking than would reflexive control efforts. Clients are told that when people step in quicksand, they try to get out of it as fast as they can, usually by kicking their feet and paddling frantically. This seems to be a normal, logical, sensible thing to do, but in actuality, it makes people sink much faster

than if they stay as still as possible. The faster they kick their feet and flail their arms, the faster they sink. So their experience of kicking and flailing should tell them that kicking and flailing doesn't work and so they should try to find something that might work outside the things which they thought should work. In other words, they can save their life by ignoring their logic and listening to their experience in this situation. The *Quicksand* metaphor also points to what to do when one is in this situation; in order to stay afloat in quicksand the person has to gently spread out and let his body touch as much of the quicksand as possible. The more body surface area which makes contacts with the quicksand, the more likely he will be to float. The client is then asked to consider that quitting smoking might be like being in quicksand. The logical solutions don't seem to work, and the more he tries to control things, the more difficult it becomes to go even short periods without resorting back to the calming effects of nicotine. Maybe then the thing to do is to stop struggling, to get in contact with what he is thinking and feeling when not smoking – to float his self. This metaphor also helps to convey that most people seek professional therapy and treatment for a problem believing that they need to gain more control over what they are thinking and feeling, when in fact seeking more control has been part of their problem. They think that it is important to increase comfort levels when they are 'feeling bad' and to maintain comfort levels when they are 'feeling good'. However, as the quicksand metaphor demonstrates, the solution is often not to feel *better*, but to *feel* better. Hayes et al. (1999) describe in detail a number of metaphors that can be similarly used to create contexts in which the therapist can reinforce clients' willingness and ability to remain in contact with previously avoided smoking stimuli.

Clients may be ready to progress from this phase when, without prompting, they notice their smoking-related private events as they are occurring, begin to catch themselves when they are trying to control their thinking (e.g. "There I go doing it again", "I was just

about to try to not think about something"), show signs of spontaneous willingness to experience thoughts and feelings that used to prompt conditioned avoidance/control responses, and report feeling differently about the feelings they used to fear, seemingly because they are no longer being actively resisted. Clients may question the concept of willingness if their first few attempts to willingly experience adverse private events reduces neither the frequency nor believability of these events, and the therapist may have to clarify that willingness can be tricky and require time and practice simply because willingness is the opposite of what they have been doing for such a long time.

5.9.6. Cognitive Defusion

Implementing cognitive defusion is appropriate when the client is buying into the literal truth of his thoughts, generating reasons for his behaviour, and claiming that he is unable to take valued action while a particular thought is occurring. Defusion techniques aim to deliteralise language, create distance between the thinker and the thought, expose the arbitrariness of derived verbal relations, and undermine troublesome social-verbal conventions. The goal is for clients to begin to respond to their thoughts in terms of what they actually are, bits of language, not what they say they are, literal entities. It is not possible here to describe in depth the estimated 100 published defusion techniques (see Hayes et al., 1999: pp 148-179 for an extensive review), though a brief overview of the more popular, empirically-supported techniques for quitting smokers is offered.

In ACT, the difficulty of quitting smoking stems not from smokers having 'bad' thoughts, but from evaluating thoughts as 'good' or 'bad' rather than simply looking at them or observing them. This is most evident in clients' reports of literally *being* their thoughts.

For example, a client may say, “I *am* anxious” or “I *am* afraid”, rather than “I am a person who is having the feeling of being anxious/afraid”, which is actually what has occurred. When the client shows signs of fusing the ongoing act of thinking with the content of his thought, the therapist can re-establish a healthy distance between the client and the content of his thought in several ways. One effective method is to ask the client to think of a distressing thought, starting with the words, “I am…”, buy into this thought for a few seconds and see what happens. The next time the thought occurs, the client is asked to put the words “I notice that I am having the thought that I am…” in front of the thought and see what happens. The addition of “I notice that...” draws the client’s attention to the distinction between thinking as something which the client is doing and a thought as something which is had, which helps the client to see that he is not the thought he is having, but the person doing the thinking. The intended outcome is that the client establishes a sense of self that is distinct from his thoughts, which in turn decreases the functional relations between the thought (e.g. anxiety) and corresponding actions (e.g. avoidance of anxiety-provoking stimuli).

The self can also be defused from thoughts by having clients deal with thoughts as they would deal with physical objects. Metaphors and experiential exercises in which thoughts are represented by physical things give the client the perspective of an observer looking at something that is separate from him, which helps the client to appreciate that he is generating his thoughts, not discovering them. This distance between thinker and thought also exposes the illusion of thoughts having an inherent power to control the client’s behaviour, because like other inanimate objects in our physical environment, the client sees that that he is the one who chooses how his thoughts behave, not the other way around.

Thoughts can be objectified in a number of ways to show how the locus of control lies with the thinker, not the thought. The therapist may ask the client to close his eyes and

imagine he is sitting by the side of a gently moving stream. Upstream, the client notices that a big tree over-hanging the stream, and once in a while, a big leaf falls from the tree into the stream and flows down the stream to pass by where the client is sitting. The client is asked to think of one of his 'triggers'[6] to smoking, watch the thought come into his mind, write it on the leaf, and let the leaf float away down the stream. He is encouraged to not try to change or judge any thought that shows up and to not try to make the stream flow faster or slower. He is asked only to observe the thought written on each leaf as it flows past him and to notice how he feels as he is observing each leaf. This exercise shows that, in contexts which weaken the literal, harmful functions of thoughts, clients are able to sit mindfully with their scary thoughts without reacting to them as they have tended to do in contexts in which the functional relations between these thoughts and negative smoking outcomes are much stronger.

This exercise also shows that most thoughts tend to come and go when the client is not trying to control them. The therapist may point out to the client that he is now willingly contacting the same thoughts that had been previously judged as unacceptable, and that only the context in which these thoughts are occurring has changed. Drawing attention to the role of context in changing the adverse functions of thoughts helps to undermine the literality of thoughts and shift the client's focus to creating workable contexts in which events and stimuli lose their literal triggering functions, allowing them to be experienced for what they are, just words, perhaps for the first time in a long time. The therapist may also stress here that certain thoughts are being targeted for defusion not because they are in themselves 'bad' thoughts but because the way in which the client is currently *relating* to this thought is preventing him from taking valued action.

[6] Single quotation marks are used to emphasise that the word 'trigger' in the context of smoking is an arbitrary label given to things to describe their primary function, not their formal properties.

Clients' difficulties in quitting smoking are presumed to start when they start buying into the literal meanings of relational terms like "because", "but", "cannot", "should", "must", "need" "compelled" and "I am" in the context of their smoking attributions. When clients are using these words to explain behaviour, the literal, evaluative functions of these words are likely dominating behaviour so much that the direct experiential functions of their referents are no longer contactable. Undermining the literality of troublesome verbal relations which support unworkable control strategies is a major defusion goal. One of the most unhelpful verbal relations preventing smokers from taking valued action is the arbitrary labelling of something which tends to precede smoking as a 'trigger'. In contexts in which the literal, evaluative functions of the word 'trigger' dominate, the transformation of functions from the word 'trigger' to events and stimuli which precede smoking means that the mere exposure to a 'trigger' stimulus will be viewed as a compelling reason to smoke. In ACT, smoking is not literally caused by the inherent properties of anything that is called a 'trigger'; smoking occurs as a function of the human tendency to fuse the literal meaning of the word 'trigger' to its referent and then respond to the referent as if it does what its name says it does (initiates a behaviour) instead of what the name actually is (a label which has been arbitrarily attached to describe the operant functions of this thing under certain conditions). Contrary to common testimony, clients are told that there is nothing inherently 'triggerish' about, for example, the sight or smell of coffee. Seeing or smelling coffee cannot literally cause them to smoke, nor do much else to them beyond stimulate their olfactory system. Rather, by treating the sight and smell of coffee as literal 'triggers' of smoking for a number of years, this derived relation has become a self-fulfilling prophecy.

The crucial lesson for the client here is that what they have been viewing and responding to as smoking triggers do not function as triggers because they literally are

triggers; they function as triggers because the literal functions of the word 'trigger' have transferred and strongly fused to the things which are so called 'triggers'. Exercises such as the *Milk, Milk, Milk* exercise (Hayes et al., 1999; 154-155), *The White Bear Game* (Murray, 2007), the *Bad Cup* metaphor (Hayes et al., 1999; 168-169), and the *Calling a Spade a Spade* exercise (Hayes et al., 1999: 170) can quite effectively establish contexts in which the literal truth of these troublesome words quickly weakens and almost disappears.

Clients may be ready to progress to the next phase when they show three changes. First, the client reports that exposure to private and situational smoking 'triggers' now seem less compelling as literal causes of smoking. The client may report that he still has the same thoughts he did as prior to therapy, but that they are less distressing as they once were. Second, the client reports being willing to remain in contact with smoking 'triggers' for sustained periods without responding with efforts to control the frequency of these 'triggers'. Third, the client notices when he is fusing self with thoughts and engaging in troublesome language processes and takes a step back to assess the workability of current ways of thinking. When these changes occur, it generally means that the verbal contexts established in therapy have undermined the social-verbal contexts which created cognitive fusion and promoted experiential avoidance.

5.9.7. Build Patterns of Committed Action Linked to Values

The focus of therapy up to this point will have been on what clients have been trying to move away from in their life. The acceptance and defusion skills which clients have developed up to this point clear the way to now clarify and reconnect clients with a life they

truly value, and how quitting smoking is a big part of this valued life. Despite stating at the outset that quitting smoking is a highly valued life goal, a functional analysis of clients' attributions for having so far failed to quit smoking tends to indicate that taking action to pursue the valued long-term positive reinforcement of becoming an ex-smoker has long taken a back seat to the powerful and immediate negative reinforcement of the reduction of nicotine withdrawal-related distress available via smoking. In other words, clients' current behaviour is consistent with feeling good now but inconsistent with want they truly want in life.

In this phase, the therapist helps clients to set and commit to keeping values-consistent behavioural goals, identify barriers to keeping these commitments, identifying what will need to change in order to keep these commitments, and construct and practice adaptive alternative behavioural responses to the private events which smoking had functioned to alleviate. The intended outcome is that clients choose behaviours which reify their commitment to quitting smoking, which may mean being willing to tolerate an adverse withdrawal experience. This is achieved through a sequential process of clarifying values, setting value-consistent goals, identifying barriers, and committing to valued behaviour. This is how the pragmatic goal of successful working is operationalised.

The *Sailing Boat* metaphor can helpfully illustrate the importance of clarifying what one values. This metaphor suggests that a person who goes through life without being aware of what he truly values in life and without tracking whether his current behaviour is values-consistent is like a person in a sailboat who doesn't set the direction of his sail but instead, drifts in whichever direction the wind is blowing. The person may get lucky and drift in a good direction. But only by specifying where he wants to head, positioning the sail to head the boat in the intended direction, and re-positioning the sail whenever the wind blows him off course can he ensure that he heads in a valued direction. The therapist can encourage the

client not let the ‘wind blow him around’ by remaining mindful of what he wants from life, and how his current behaviour lines up with his values. When values are clarified, achievable goals which reflect these values and concrete goals which produce these achievable goals can be identified.

The therapist helps the clients to set concrete goals to achieve in the short, medium, and long term that are linked to how the client wants to live his life. Goals in the pursuit of valued living should be specific and measureable; practical, flexible, and within the client’s physical and intellectual capabilities; and made public. Clients may be asked what they feel is stopping them from moving in a valued life direction at the moment. Depending on how strongly the therapeutic messages of earlier sessions landed, clients may report that their unwillingness to remain in contact with aversive private events in certain contexts remain their most significant barrier to quitting smoking at the moment. Such an answer would represent a promising sign that clients are beginning to acknowledge the unworkability of their avoidance coping strategies, and beginning to link their commitment to quitting smoking to the importance of being wilfully mindful of smoking cues and defusing troublesome thoughts. Committing to valued behaviour, in turn, should increase clients’ exposure to opportunities to practice acceptance and defusion of adverse private events which are experientially important for smoking cessation to occur.

The final step is for the client to commit to practical, realistic behavioural alternatives to smoking that are not merely attempts to quit smoking but attempts to continue on the path to valued living. The therapist and client work together to construct alternative behavioural responses to negative affect, nicotine craving, and situational smoking stimuli that are consistent with the ACT principles of experiencing all private events as they are and responding to the workability rather than the literality of private events. Increasing

opportunities for exposure to positive reinforcers are encouraged (i.e. do X because it is better than doing Y), so long as the client does not use another activity or relationship primarily as a means to avoid smoking thought and behaviour, which is given as the rationale for distracting activities in CBST (i.e. do X so as to avoid doing Y). For example, going to the gym is a healthy pursuit and is encouraged if being at the gym is something which the client values in itself. However, using the gym primarily as a means to consume time which would otherwise be spent thinking about smoking draws the client back into viewing smoking thoughts as literal causes of smoking, and back into an agenda of avoiding certain thoughts and situations. The therapist should help the client to notice when alternative behaviours are being proposed for their avoidance functions rather than their value-based functions. The intended outcome of this phase, and the therapeutic process as a whole, is that clients choose to behave in line with their valued life direction of becoming an ex-smoker in the face of cognitive, emotional and physical distress occasioned by nicotine withdrawal.

5.10. EFFICACY OF ACT FOR SMOKING CESSATION

The empirical study of ACT as a whole is still in its infancy but, according to Hayes (2008a), is "progressing well as measured against its own goals" (p.291). Over 35 RCTs, conducted by different research teams, have demonstrated ACT to be an equivalent or superior treatment than ESTs for a range of psychological and behavioural problems, with pre-post effect sizes (Cohen's *d)* for clinical improvement measures ranging from 0.57 to 0.95, and tending to be as large or larger at follow-up assessments that at post-intervention (Hayes et al., 2006; Ost, 2008; Powers, Zum Vörde Sive Vörding, & Emmelkamp, 2009).

Additionally, clinical improvement in ACT has consistently been found to be mediated by subjects' post-intervention increases in the core theoretical change processes of psychological acceptance and flexibility, mindfulness, cognitive defusion, and clarity of values (see Hayes et al. (2006) and Ruiz (2010) for extensive reviews of ACT mediation studies). ACT also appears to be clinically effective in the format of relatively brief interventions (i.e. less than five therapy sessions) and produce statistically significant effects in underpowered research designs. In sum, early indications suggest ACT shows promise for both effecting and yielding information about the mechanisms of clinically significant cognitive and behaviour change.

However, ACT for smoking cessation has not yet been scrutinised to the level of ESTs for tobacco dependence and other substance use disorders, due possibly to several factors. First, the recent manualisation of ACT and a dearth of accredited ACT training programmes available to clinicians and doctoral students in the US and the UK mean that the community of practicing ACT therapists is still small. Second, procuring the funding necessary to mount intensive RCTs of a novel behavioural treatment is also difficult in austere times when large funding institutions, such as the National Institute of Health (NIH) in the US and the National Health Service (NHS) in the UK, have given notice of their intent to priority fund RCTs of well-established ESTs for smoking cessation and research which advances knowledge of the neuroscience of nicotine addiction. This means that, at the present moment, proposals to evaluate ACT as an adjuvant to CBST or another EST, such as nicotine replacement therapy or another form of pharmacotherapy, would likely be given funding priority over proposals to evaluate ACT *against* these ESTs.

Consequently, there are only eleven published applications of ACT as a treatment for substance use disorders in clinical samples, four of which are nicotine-dependent adults. To emphasise the early stage of the ACT substance use research programme, six of these eleven

publications are described by the authors as ‘preliminary’, ‘pilot’, or ‘initial’ investigations (Gifford, Kohlenberg, Hayes, Antonuccio, et al., 2004; Brown, Palm, Strong, Lejuez et al., 2008; Hayes, Wilson, Bissett, Gifford et al., 2004; Twohig, Shoenberger, & Hayes, 2007; Luoma, Kohlenberg, Hayes, Bunting & Rye, 2008; Hernandez-Lopez, Luciano, Bricker, Roales-Nieto, & Montesinos, 2009); one is described as ‘a feasibility study’ (Bricker, Mann, Marek, Liu, & Peterson, 2010); and two are single case studies (Batten & Hayes, 2005; Stotts, Masuda, & Wilson, 2009). Moreover, the true effects of ACT for smoking cessation have been obscured in some studies by its examination *as part* of a treatment package which included other active treatments which are known to be effective for the presenting problem (e.g. Brown et al., 2008; Gifford, Kohlenberg, Hayes, Pierson, et al., 2011). Thus, ACT for smoking cessation does not yet meet the criteria required for an empirically-supported treatment (Chambless & Hollon, 1998), but according to Hayes (2008b), it is approaching empirical status. The remainder of this chapter describes the findings reported by the preliminary investigations of ACT for smoking cessation, and considers the methodological caveats to be addressed in future investigations.

5.10.1. Multiple-Arm Trials

Gifford et al. (2004) randomised 76 self-reported nicotine-dependent smokers (10+ cigarettes per day for 12+ months) to a 7-week course of either ACT or NRT (the transdermal nicotine patch in this study). Participants in the NRT condition attended a 90-minute patch education meeting in the first week and received 22 mg nicotine patches for four weeks followed by 11 mg patches for three weeks. All patches were given free of charge. ACT was delivered in seven 50-minute individual sessions and seven 90-minute group sessions (16

hours and 20 minutes total contact time). The ACT protocol provided a rationale for and training to accept previously avoided interoceptive cues to smoking and to abandon avoidance control/avoidance as the problem. Therapists helped participants to identify their internal and external smoking triggers, alter the triggering functions of cognitions through defusion techniques, practice adaptive behavioural responses in the presence of negative affect and other internal triggers, and make public commitments to behave in line with their values.

Of the 76 participants randomised to treatment 63.6% (n = 21) completed the ACT treatment and 61.9% (n = 33) completed the NRT treatment. Expired CO-verified 24-hour point prevalence smoking self-report data were collected at baseline, post-treatment, six-month follow-up, and 12-month follow-up. Controlling for baseline smoking, logistic regression analyses on only treatment completers found that quit rates did not significantly differ between ACT and NRT at post-treatment (35% vs. 33%, p = 0.93) or six-month follow-up (23% vs. 11%, p = 0.36). However, ACT had produced significantly more quitters than NRT at one-year follow-up, with 35% quit versus 15% in the NRT condition (p = 0.04, OR = 4.2, CI95: 1.04 to 16.73).

Logistic regression analyses re-run under the worst-case scenario assumption in which all missing data were converted to smoking status found that ACT participants were 2.6 times more likely than NRT participants to have quit smoking at one-year follow-up. However, the quit rates (21% vs. 9%) were not significantly different, which the authors attributed to their low cell size; with an odds ratio of 2.62 and cell sizes of 33 and 43, the logistic regression analysis had only 31% power to detect a significant intervention effect at *p* = 0.05. Detecting a statistically significant intervention effect with these cell sizes would have required an OR of 5.0 (i.e. one group would need to be five times more likely to quit

than the other group), a magnitude of difference which is typically rare in comparisons of two active treatments.

In summary, both an efficacy analysis and intent-to-treat analysis showed ACT to be more than twice as effective as NRT in producing long-term abstinence in nicotine dependent smokers. Furthermore, one-year outcomes were fully mediated by the extent to which participants responded with acceptance and flexibility to smoking thoughts, feelings, and bodily sensations, as measured by the Avoidance and Inflexibility Scale (AIS: Gifford Antonuccio, Kohlenberg, Hayes et al., 2002), but not by their severity of negative affect or withdrawal symptoms post-quit. It is difficult to disentangle whether this mediational effect indicates that reducing experiential avoidance facilitated quitting behaviour, or whether the message implicit in the rationale for NRT about the need to control one's internal experience in order to quit smoking, or both to some degree. Nonetheless, ACT produced twice as many quitters at 12-month follow-up than NRT and so appears to warrant addition to the armamentarium of behavioural treatments for smoking cessation. One limitation of this study, however, was the researchers' use of a liberal measure of smoking abstinence – no smoking in the past 24 hours – as the primary outcome measure and no secondary measure, rather than the recommended measures of prolonged abstinence (primary) and seven-day point prevalence abstinence (secondary) (Hughes et al., 2003). Assessing abstinence from smoking in only the past 24 hours may have given an inflated sense of either treatment's efficacy.

In a larger unpublished study using a similar ACT protocol, Gifford et al. (2002) randomly assigned 306 nicotine-dependent smokers to receive ACT plus Bupropion SR or Bupropion SR alone. Only 44% of participants provided CO-verified seven-day point prevalence smoking data at 12-month follow-up. An intent-to-treat analysis conducted under the worst case scenario assumption of missing data meaning no change in smoking status

indicated that quit rates were significantly higher among ‘ACT/Bupropion SR combination’ participants than among ‘Bupropion SR alone’ participants at both post-treatment (66% vs. 22% in ‘Bupropion SR alone’ condition, $p < 0.05$) and one-year follow-up (22% vs. 9% in ‘Bupropion SR alone’ condition, $p < 0.05$). While the results of Gifford and colleagues’ studies suggest the promise of ACT as a good alternative and a good adjunct to established pharmacotherapies for smoking cessation, the absence of a comparison behavioural treatment in these two studies precludes cast doubt on the conclusion that these positive efficacy findings were specific to the functional ACT model rather than generalisable to the broader class of behavioural interventions for smoking cessation.

Hernandez-Lopez et al. (2009) addressed this question by assigning 81 nicotine-dependent smokers to either seven weekly 90-minute group sessions (8-10 participants per group) of smoking-focused ACT or CBT, and assessing the prolonged and past 30-day point prevalence of abstinence from smoking at three, six, and twelve month follow-up assessments. Random assignment to treatment conditions was not possible due to the contractual obligation of one of the treatment sites to offer CBT to anyone seeking assistance to quit smoking. The ACT protocol focused on values clarification, committing to valued action, fostering willingness to experience smoking stimuli, postulating experiential control as part of the problem, cognitive defusion, and relapse as part of the process of quitting. The CBT protocol focused on linking thoughts and feelings to behaviour (e.g. psychoeducation about the role of anxiety and stress in smoking behaviour), monitoring for triggers and high-risk situations, discussion of the health consequences of smoking, nicotine fading, strategies for avoiding external triggers and controlling internal triggers, and giving information about the abstinence violation effect.

Of the 81 participants who began treatment, 27 (62.8%) ACT participants and 29 (76.3%) CBT participants completed at least five sessions, and 43 were retained at 12-month follow-up. ACT was rated by participants as more acceptable than CBT: 91.7% of participants reported that the ACT treatment was useful compared to 79.2% for CBT. An intent-to-treat logistic regression analysis showed that ACT participants were five times more likely than CBT participants to be abstinent (no smoking in past 30 days) at 12-month follow-up (30.2% vs. 13.2% for CBT, p = 0.02; OR = 5.13). When treatment completers were analysed separately in an adjusted logistic regression equation, ACT participants were 9.69 times more likely to be abstinent at 12-month follow-up (48.1% vs. 17.2%, p = 0.02). Comparisons of prolonged abstinence rates at six and twelve month follow-ups showed a similar superiority of ACT over CBT. Overall, this study gave the first indication that, even with limited statistical power, ACT is capable of producing more ex-smokers than CBT in a community treatment setting, and that the clinical foci of ACT were acceptable to most participants. However, participants in this trial were not randomised to treatment conditions and participant retention at the furthest follow-up assessment was low (44%). Perhaps most significantly, the investigators did not examine the relation between the theoretically-relevant processes of smoking behaviour change and smoking outcomes and so no conclusions can be drawn about why ACT was superior to CBT.

5.10.2. Single-Arm Trials

Bricker et al. (2010) conducted the first telephone-delivered ACT intervention for smoking cessation, delivered over five calls (one x 30-minutes plus four x 15-minutes) to fourteen participants over a three-month period. Intent-to-treat analyses conducted under the

worst case scenario (missing data converted to smoking status) showed that 43% (n = 6) of participants had not smoked on the day of the 20-day follow-up, 29% (n = 4) had not smoked in the past seven days at 20-day follow-up, and 29% indicated at twelve month follow-up that they had not smoked *at all* in the past twelve months. This twelve month quit rate is astonishingly high for a telephone-delivered health intervention with such limited power, and more than double the 12% of people who are achieve long-term abstinence with coping skills-focused Quitline smoking cessation counselling (Stead, Perrera, & Lancaster, 2006). In addition, participants reported significant baseline to post-treatment increases in the putative ACT processes of acceptance of trigger thoughts, emotions, and cravings, and commitment to quitting.

Brown et al. (2008) developed a novel, intensive behavioural intervention to increase distress tolerance among smokers with a quitting history characterised by early lapses (defined as no quit attempt in the past ten years sustained for longer than 72-hours). The intervention incorporated behavioural and pharmacological components of standard smoking cessation interventions with components of ACT aimed at increasing participants' tolerance for withdrawal distress. Sixteen participants began the intervention, which was delivered over six 50-min individual sessions, nine two-hour group sessions, and eight weeks of transdermal nicotine patch. It is perhaps useful to summarise the outcomes before turning to the problems with a CBT/NRT/ACT mixed treatment model.

Seven-day point prevalence abstinence rates at the 8, 13, and 26 week post-quit date follow-up assessments were 25.0%, 18.75%, and 0% respectively. The median time of continuous abstinence at any point during the 26 week follow-up period was 24 days; the mean number of total days abstinent during both the treatment and follow-up periods was 40.5 days out of 180 days (i.e. abstinent for 22.5% of entire study). Latency to first lapse was

also delayed in most participants; thirteen abstained for longer than 72-hours, twelve abstained for longer than one week, eleven abstained for longer than two weeks, and seven abstained for longer than one month. Given that no participant had previously sustained abstinence for longer than 72-hours, the high median number of continuous abstinence days post-quit and that the majority of participants managed to sustain abstinence for longer than one-week suggests the potential efficacy of this multi-component protocol for increasing the latency to a smoking lapse in historically early-lapse smokers. Again, however, with no comparison treatment condition and no data were collected on the putative ACT and CBT mechanisms of change, a mediation analysis of participants' pre-post change in latency to smoke could not be conducted.

This protocol is however, in this author's opinion, theoretically incoherent. The standard behavioural components of the protocol included self-monitoring, identifying triggers, developing self-management strategies for coping with external triggers (e.g., avoid, alter, use a substitute), and relapse-prevention skills (e.g., identifying and planning for high-risk situations). The ACT components included acceptance, defusion, values and committed action, and self-as-context. The authors state that "careful attention was given to the distinction between external versus internal triggers, as different strategies were emphasized for each" (p315). From a pragmatic perspective, the protocol would appear to be useful for facilitating smoking cessation in this at-risk sub-population of quitting smokers. For the purposes of progressing clinical science, however, fostering an avoidance coping stance towards external triggers whilst simultaneously fostering an acceptance stance towards internal triggers is, according to the manualised definition of ACT (Hayes et al., 1999), theoretically inconsistent[7].

[7] Steven Hayes has acknowledged this inconsistency to the author in a personal communication.

Emphasising the need of participants to avoid exposure to certain external triggers in the early stages of their quit attempt directly contradicts the core assumption of ACT that experiential avoidance, including avoidance of external experiences, is part of the problem; by extension, training participants to identify high-risk situations as if the stimuli in these situations are literal triggers of smoking directly conflicts with their training to notice when they are buying into the literality of the verbal labels that are attached to smoking stimuli and to practice defusing the label from the stimulus. For example, the authors proposed that "prospective quitters needed to demonstrate a willingness to remain in this uncomfortable state with an acceptance of the discomfort and distress involved as they worked toward their desired goal of quitting smoking" (p310); at the same time, participants were instructed to avoid the situations which occasion this 'acceptable' discomfort and distress. This poses the question: if situational stimuli trigger thoughts, feelings, and sensations, and these thoughts, feelings, and sensations are acceptable, why are the situational stimuli which occasion these 'acceptable' private events not also acceptable? People suppress thoughts and feelings when they fear their consequences, not their antecedents. The distinction between external and internal triggers in this protocol amounts to an admission that the external stimuli that are labelled as 'triggers' *literally* are smoking triggers and so should be avoided, whereas internal 'triggers' are only *derived* triggers and so do not *literally* cause smoking. Making this distinction would likely have created a social-verbal context in which participants responded to the literal 'triggering' functions of external stimuli such that exposure to these 'triggers' would be viewed as compelling reasons to smoke. The ACT position described in the core ACT text (Hayes et al., 1999) is that *no* stimulus, internal or external, can literally cause behaviour, but can come to cause behaviour in contexts in which the literal functions of the stimulus dominate. That is, smoking occurs as a function of a stimulus, not its presence, a position which is directly contradicted by the training of avoidance strategies to cope with

external ‘triggers in this protocol. By encouraging participants to respond to the literal functions of external stimuli and the experiential functions of internal stimuli, the therapists would have created a context which supported participants to evaluate all encountered smoking stimuli in order to know what is the acceptable ‘good’ and the literally unacceptable ‘bad’. The fusion of the literal meaning of the ‘trigger’ label with the external stimuli to which the label refers would likely have then promoted avoidance behaviour as a matter of verbal rule, even when it is not called for or helpful to do so.

In addition, training quitting smokers to avoid certain situations is inconsistent with ACT’s message of living a valued life in the face of discomfort; indeed, as many smoking triggers tend to be found in social situations, this protocol’s suggestion of avoiding external triggers would likely have reduced participants’ opportunities for exposure to the positive reinforcement of valued behaviours (i.e. meeting new people, catching up with friends).

Thus, Brown et al.’s (2008) distress tolerance protocol, though effective for increasing time to first lapse in this small sample of early lapse smokers, does not appear to constitute a valid test of the ACT model (or the CBT model) in that the protocol simultaneously emphasised the literality of external events as smoking triggers while training techniques to deliteralise the role of internal events as triggers, and encouraged avoidance of some stimuli while encouraging acceptance of other stimuli which were strongly verbally linked to the to-be-avoided stimuli. It would be perfectly understandable if participants were confused by these mixed messages, and since no data were collected on the putative mediators of each technology, we cannot know which messages were most strongly related to positive outcomes. This study, therefore, yields little information about how one may refine the theoretical bases of an ACT and CBT intervention for smoking cessation, and in turn maximise the effectiveness of this protocol. However, further commentary on this

interpretation, and alternative interpretations of the theoretical coherency of this protocol, should be welcomed.

5.10.3. The Need for More High Quality ACT RCTs

A shortage of high quality RCTs should perhaps be expected given the early stage of the development of the ACT research programme. Mounting intensive, methodologically stringent evaluations of ACT as a treatment for a number of psychological problems has proved difficult for ACT researchers due in large part to the sizeable funding discrepancy between controlled evaluations of ACT and CBT (Gaudiano, 2008, 2009); a recent meta-analysis found that 80% of CBT RCTs were funded compared to only 38% of ACT RCTs, and that CBT RCTs were funded to a level five times greater than ACT RCTs (Ost, 2008). Funding bodies like the NIH and NHS do not tend to fund research into new treatment approaches until a sufficient amount of preliminary data from pilot studies demonstrate the potential efficacy, effectiveness and cost-effectiveness of the treatment in real-world settings. The fact that 62% of ACT RCTs in Ost's meta-analysis had been conducted without funding, many in the form of doctoral dissertation studies, goes a long way, Gaudiano argues, to explaining why, compared to matched CBT RCTs, ACT RCTs have tended to involve significantly fewer participants, fewer therapy weeks, fewer therapy sessions, fewer therapy hours, fewer active therapists, fewer months to final follow-up assessment, less paid-for study advertising, and a higher proportion of participants recruited from within university staff and student populations.

As a new, largely unfunded behavioural approach to treating psychopathology, Gaudiano has argued that the initial investigations of ACT should not be subjected to the same

criteria which determine the methodological stringency of established treatments like CBT. Rather, most ACT trials are best thought of as pilot/proof-of-concept studies which lay the groundwork for applying for funds to conduct a more intensive, larger scale test of the treatment model. Ost (2009), in turn, rebutted Gaudiano's assertion, arguing that many measures of methodological stringency can be implemented at little or no cost. Ost questioned how much longer ACT should be considered a young and promising treatment approach, and identified 15 methodological criteria which investigators should consider when planning future RCTs in order to evaluate ACT against other ESTs.

Financial constraints have also led researchers to examine ACT through a series of small, short, and targeted studies of the theoretically relevant processes of change. For example, given the health consequences of smoking, well-funded smoking cessation trials tend to evaluate interventions which incorporate a-theoretical 'grab-bag' combinations of helpful technologies which may improve outcomes but at the expense of obscuring clarity about the intervention's crucial mechanisms of change (Gifford et al., 2004). In the absence of such funding, the inductive approach of stripping ACT interventions down to their essential components and examining the mediation of health behaviour change by the ACT model's putative processes of change has led to the application of ACT as a functional, data-derived treatment for a wide range of psychological problems that are characterised by an individual's desire for experiential avoidance, fusion with distressing thoughts and emotions, and a lack of clarity about values and commitment to valued behaviour.

Finally, Forman, Herbert, Moitra, Yeoma, and Geller (2007) raise two concerns about investigators and authors of the ACT RCTs conducted to date. First, they point out that many of the studies which claim to show an equivalent or superior effect of ACT relative to other ESTs have been conducted by therapists well-known to have an allegiance to the ACT model.

Allegiance to a model does not itself invalidate data for that model, but has undoubtedly provided fodder for sceptics who suggest that positive efficacy findings for ACT are largely yet to be replicated by multiple independent research teams, and moreover, point to the fact that much of the empirical support for ACT has come from studies co-authored by Steve Hayes, the co-creator of ACT. Second, as many ACT RCTs have been delivered by highly trained, highly experienced clinicians, they suggest that much of the data on ACT may not well generalise to real-world clinical and community settings in which therapists are likely to have little to a moderate amount of experience in delivering ACT.

5.11. Summary of the Empirical Status of ACT for Smoking Cessation

At this time, the lack of several well-powered, methodologically stringent ACT RCTs conducted to date means that ACT does not yet be fulfil the criteria for an EST for smoking cessation. The handful of controlled trials conducted to date suggest that, even with limited statistical power, smoking cessation interventions which focus on reducing smokers' negatively reinforced avoidance of interoceptive smoking cues, enhancing acceptance skills, and fostering commitment to values-consistent behaviour in the presence of smoking cues are viable, acceptable to participants, and equally or exceedingly effective at producing long-term smoking abstinence in nicotine dependent individuals compared to ESTs for smoking cessation. An average one-year abstinence[8] rate of 22 to 35% among ACT recipients in these trials represents a marked increase on the 14 to 19% abstinence range in people who receive practical counselling (i.e. coping skills training). However, one must caution that the latter

[8] Different point prevalence measures of abstinence were used in these three studies.

figure is an abstinence range aggregated over many more treatment arms (n = 104) within a well-controlled meta-analysis.

Preliminary mediation analyses have also suggested that smoking-focused ACT works in a way predicted by its underlying model: one-year smoking abstinence resulted from clients' increased willingness to remain in contact with the difficult private experiences which were presumed to be causing smoking (Gifford et al., 2004). It is widely acknowledged, however, that more well-powered, methodologically stringent, direct comparisons of ACT with behavioural therapies of established efficacy for smoking cessation are needed, and that researchers should examine mediation of ACT and CBST outcomes by their theoretically-distinct processes.

CHAPTER SIX: A POTENTIAL MODERATOR OF CBST'S EFFICACY FOR SMOKING ABSTINENCE: PARADOXICAL EFFECTS OF EXPERIENTIAL AVOIDANCE

6.1. IMPROVING CBST OUTCOMES BY CLIENT-THERAPY MATCHING

Identifying relapse-promoting mechanisms and tailoring smoking cessation interventions accordingly for populations at higher risk-of-relapse remain national priorities in the US (US Department of Health and Human Services, 2004) and the UK (National Institute of Clinical Excellence, 2008). Brown et al. (2005) state that "significant strides in smoking cessation ultimately may be found in the ability to develop specialized treatments

that target the particular needs of subgroups of smokers, especially those who are at higher risk for relapse, rather than in expecting any single treatment approach to be a panacea" (Brown, 2005: 714). Even if CBST is not generally more effective than other behavioural interventions in facilitating smoking cessation, as suggested by Hajek et al.'s (2009) meta-analytic findings, CBST may still be more effective than its behavioural alternatives for specific sub-groups of smokers. Examining the characteristics which may moderate clients' success in acquiring and performing the coping skills that are taught in CBST should, in theory, inform better treatment-patient matching and predictions about who can be helped through alternative mechanisms of change. The questions for researchers and clinicians are, therefore: what characteristics do theory and data propose as a useful basis for matching smokers to CBST? And, do smokers who are matched to CBST on these bases have better outcomes than smokers who are mismatched or randomly assigned to treatment?

6.2. INDIVIDUAL DIFFERENCES IN PARADOXICAL EFFECTS OF EXPERIENTIAL AVOIDANCE

A rapidly expanding theoretical and empirical literature over the past 20 years has converged on the hypothesis that smokers' tendencies to experience *paradoxical effects of experiential avoidance* – when attempts to suppress unwanted thoughts, feelings, and behaviours paradoxically enhances the frequency and intensity of these unwanted experiences – may be important determinants of smokers' abilities to acquire and perform avoidance coping strategies as part of their plan to quit smoking. The theory of cognition which popularised the term 'paradoxical effect' – Wegner's (1994b) theory of ironic processes of

mental control – implies that learning and performing CBST's coping strategies may only be therapeutic for smokers who are skilled at suppressing their unwanted thoughts, feelings and behaviours. On the other hand, smokers who tend to experience paradoxical effects of experiential avoidance under laboratory conditions may also be the more likely to experience a similar paradoxical effect of avoiding internal smoking cues (i.e. thoughts, feelings, and physical sensations): enhanced awareness of these cues and, in turn, increased motivation to smoke to rid these cues. From a treatment perspective, this hypothesis would suggest that matching smokers to a smoking cessation therapy model on the basis of their tendencies to show paradoxical behavioural effects of experiential avoidance may significantly improve upon the quit rates yielded by patient-therapy mismatched designs and randomised therapy designs.

6.3. THEORETICAL ROOTS OF THE 'PARADOXICAL EFFECT'

Russian novelist, Fyodor Dostoyevsky (1863), noted the difficulty in suppressing even the most innocuous thought: "Try to pose for yourself this task: not to think of a polar bear and you will see that the cursed thing will come to mind every minute". Coincidentally, another Russian novelist, Leo Tolstoy, was said to have challenged his younger brother to stand in a corner until he could stop thinking of a white bear, to which the poor boy remained there, perplexed as to why trying to not think of the white bear left him able think of little else. Inspired by the predicament of Tolstoy's brother, Daniel Wegner and colleagues have spent the past 20 years investigating what happens when people make a conscious, deliberate effort to suppress a particular thought, emotion, or behaviour.

In their original thought suppression experiments, Wegner, Schneider, Carter and White (1987) asked participants verbalise their thoughts for five minutes while trying to suppress the thought of a white bear, but to ring a bell in case they did have a 'white bear' thought. In trying to not think of a white bear, participants tried to pursue other lines of thought and for a while succeeded. However, suppression was never complete as they indicated thinking about a white bear more than once per minute on average. Then, when participants were asked to cease suppression and talk freely about white bears, they did so at an accelerated rate, producing more mentions of the white bear than a second group of participants who had been asked to think of a white bear from the start. Paradoxically, the effort to suppress the thought of a white bear not only produced an immediate enhancement of white bear thoughts during active suppression, but also appeared to make participants particularly inclined to become preoccupied with thoughts of a white bear once suppression had ceased. These experiments yielded the first empirical evidence of two ways in which thought suppression can backfire: an immediate enhancement of unwanted thoughts and a post-suppression rebound of unwanted thoughts. According to Wegner (in Goode, 2000), the 'white bear' experiments show how "tiny little things just grow, mostly by our attempts to stop them…it's almost like trying to put it out of your mind causes it to be put into indelible type".

Since the 'white bear' experiments, over one hundred studies, using close approximations of the 'white bear' experimental design, have reported evidence that instructing participants to suppress a variety of neutral, personally-relevant, and emotional thoughts leaves them thinking, feeling, and doing little else. The literature includes evidence of increased sympathetic arousal when instructed to suppress exciting thoughts (Wegner, Shortt, Blake & Page, 1990); increased wakefulness when instructed to fall asleep quickly

(Ansfield, Wegner, & Bowser, 1996); increased anxiety when instructed to relax (Wegner, Broome, & Blumberg, 1997); increased sensitivity to the pain produced by a cold pressor when instructed to avoid focusing on pain (Cioffi & Holloway, 1993); improved memory recall for items which were not to be memorised (Wegner, 1992); increased excitation when instructed to suppress exciting thoughts (Wegner, Short, Blake, & Page, 1990); and heightened food urges when instructed to suppress urges (Soetens & Braet, 2005), among many other examples (see reviews by Wegner, 1994b and 2009).

6.4. THE CLINICAL SIGNIFICANCE OF PARADOXICAL EFFECTS

Paradoxical effects of thought/emotion suppression are clinically important phenomena because people tend to pay closer attention to thoughts and emotions that are relevant to their problems. Individuals who are more distressed by intrusive thoughts and who more strongly believe that intrusive thoughts are playing a role in maintaining their problems will likely try harder to suppress intrusive thoughts, and consequently, these individuals, should be particularly vulnerable to more frequent thought intrusions. Theories of obsessional thinking (Rachman & De Silva, 1978; Salkovskis, 1984), for example, suggest that intrusive thoughts transition to obsessions by virtue of an enhanced perception of the significance, threat, and personal responsibility associated with unwanted thoughts (Wenzlaff & Wegner, 2000). Suppression efforts which subsequently lead to intrusions should further enhance the significance of unwanted thoughts and the functional importance of removing them, and the emotions that arise when we find that we cannot easily, if at all, control the contents of our own minds can in this way feedback to yield renewed attempts at suppression or responding

with behaviours (e.g. smoking) that are tightly linked with effective suppression of the unwanted thought (Wegner, 1994b). Thus, beginning with the small ironies which result from an initial suppression, an individual can quickly become trapped in a self-escalating cycle in which more of the perceived solution (suppression) leads to more of the problem (the unwanted thought) which leads to more of the solution, and so on. Moreover, this cycle may be fairly difficult to break because the worry that comes with every failure to suppress a thought should make it more important that we avoid the intruding thought.

The main implication of the ironic process theory for treating nicotine dependence is that behavioural interventions that train clients a range of ways to avoid the thoughts and emotions which motivate smoking may unwittingly be prescribing what turns out to be a problem-maintaining solution for a number of clients. A relapse to smoking following a course of CBST, which trains clients to use more effective but functionally similar forms of thought and emotion (and environment) avoidance, would therefore be conceptualised in Wegner's theory as a type of post-suppression behavioural rebound effect – the behavioural manifestation of suppressed thoughts which occurs soon after suppression of these thoughts has ceased.

6.5. Paradoxical Effects of Suppressing Smoking-Related Thoughts and Emotions

The following sections describe correlational, experimental and clinical process data that suggest that making active efforts to suppress smoking thoughts, feelings and behaviours

often has the immediate and/or delayed paradoxical effect of enhancing the saliency of the very experiences that were to be suppressed.

6.5.1. Correlational Data

Salkovskis and Reynolds (1994) instructed 62 current quitting or recent ex-smokers to either suppress smoking thoughts, mention smoking thoughts as they occurred, or relax for a five-minute period, and to record the frequency of any smoking thoughts which did occur using a 'golf shot' clicker. At the end of this five-minute period, all participants were instructed to think about whatever they wanted for a second five-minute period and to record any smoking thoughts that occurred during this period. Participants who had initially suppressed smoking thoughts reported experiencing significantly more smoking thought intrusions during the free-thinking period than participants in the initial mention condition, i.e. a post-suppression rebound effect was observed. Additionally, when low suppressors in the suppression condition and high suppressors in the mention condition were removed from analyses, participants in the suppression condition also showed a significant immediate enhancement of smoking thoughts during the initial five-minute suppression period relative to participants in the mention and relaxation conditions. That is, the degree to which participants tried to suppress thoughts was positively related to the intensity of their immediate enhancement of thoughts. These findings suggest that, to the extent that quitting smokers believe that certain thoughts are responsible for their smoking and are motivated to avoid them, trying to suppress these thoughts as part of the quit plan may increase the difficulty of quitting by paradoxically stimulating the thoughts that have become conditioned stimuli for smoking.

Toll et al.'s (2001) finding that current quitting smokers self-reported a significantly higher tendency to suppress smoking thoughts than did ex-smokers both suggests something special about the abstinence experience that promotes thought suppression as a favourable coping strategy, and something about thought suppression which increases the difficulty of smoking cessation. This conclusion is made tentatively however because it is not clear whether ex-smokers were no longer high suppressors because they were now quit (they suppressed to quit) or because they were never high suppressors (they quit without suppressing).

Haaga and Allison (1994) retrospectively examined the extent to which the use of two broad coping styles – cognitive restructuring (e.g. thinking about the health benefits of quitting) and thought suppression – predicted the abstinence status of 91 ex-smokers at three months and twelve months post-quit. The ex-smokers who more often used cognitive restructuring techniques were found to be more likely to be abstinent at both follow-up points relative to the ex-smokers who had relapsed by these follow-up points. By contrast, the use of thought suppression was not significantly associated with continuous abstinence at either follow-up point, though this does not necessarily implicate thought suppression in relapse.

6.5.2. Experimental and Clinical Data

While correlational studies have found that suppressing smoking thoughts/emotions as part of a quit attempt is more strongly associated with continuing to smoke than ex-smoking, it is important to note that these findings are not evidence that smoking thought suppression *causes* a smoking lapse/relapse. A handful of prospective studies, however, have

shown that an active suppression of smoking thoughts at time-one results in more frequent smoking up to one week to two years later.

Erskine et al. (2010) recruited 85 current smokers with no intention to quit to monitor their cigarette consumption and stress levels over three consecutive weeks. In week one, all participants were asked only to record their cigarette consumption and stress level each night. On day one of week two, participants were instructed to either try to not think about smoking and to suppress any thoughts about smoking that did occur during the next week (suppression group, n = 30) or to think about smoking as frequently as they could during the next week (expression group, n = 29)[9]. On day one of week three, all participants were instructed to only record their cigarette consumption and stress level. Results showed that participants in the suppression group smoked significantly more cigarettes in week three than participants in the expression group and the control group. Additionally, the suppression group showed a significant increase in smoking from week two (active suppression) to week three (post-suppression), indicating a post-suppression behavioural rebound effect for these smokers in naturalistic settings.

Rogojanski, Vettesse, and Antony (2011) studied the relative effects of a thought suppression strategy and a mindfulness strategy for managing cue-induced smoking cravings on smoking frequency, self-efficacy to quit, negative affect, and self-reported level of nicotine dependence in 61 smokers who were not currently trying to quit. Smokers who were more fearful of cue-induced craving at baseline (i.e. high state anxiety sensitivity smokers) reported a significant increase in self-efficacy to quit smoking following seven days of using the suppression strategy. By contrast, high state anxiety sensitive smokers reported a

[9] A control group (n = 26) was also examined, however, the article does not state what instructions were given to this group on day one of week two.

significant decrease in self-efficacy to quit following seven days of accepting smoking thoughts and feelings in a mindful way. Both strategies produced significant decreases in cigarettes smoked over the seven-day study period, though only the mindfulness strategy yielded a significant decrease in negative affect and self-reported level of nicotine dependence.

Bricker, Schiff, Comstock, Wyszynski, and Schimmel-Bristow (2011) tested the hypothesis that a higher tendency toward an avoidant coping style at age 18 would predict an escalation in smoking and a failure to quit smoking by ages 20 and 28. As no validated measures of avoidance coping existed at the study outset, the investigators measured avoidance coping by their agreement with two statements: "When I have a problem, I usually just give up" and "If something does not go well, I keep at it until it does" (reverse coded). Logistic regression analyses showed that, compared to less-than-daily smokers who were low on avoidance coping, less-than-daily smokers who were high on avoidance coping at age 18 were 2.52[10] times more likely (CI95: 1.46 to 4.34) to make the transition to at-least-daily smoking by age 20. However, avoidance coping at age 18 did not significantly predict smoking escalation at age 28 or smoking cessation at ages 20 or 28. In other words, adolescents who tended to cope with problems by avoiding them were found to be at greater risk for starting smoking in the short but not long term. The authors suggest that this finding supports the notion that adolescent smoking initiation occurs within a feedback loop in which the adolescent perceives more stress, tries to avoid stressful thoughts and feelings, suffers as paradoxical increase in stress as a consequence, and becomes more motivated to experiment with smoking as a stress reduction resource.

[10] Odds ratio

Data reported by Dugan, Llyod, and Lucas (1999) also fit this interpretation. Adolescents (aged 11 to 16.5 years) who reported more stress and more frequently trying to avoid and distract themselves from stress at time-one were found to be more likely to have progressed from never smoking to occasional smoking six months later. Similarly, adolescents who reported more frequently trying to avoid and distract themselves from stress and more strongly agreeing that smoking is a good coping resource at time-one were more likely to have progressed from occasional smoking to regular smoking six months later.

6.6. TREATMENT IMPLICATIONS OF RESEARCH ON PARADOXICAL EFFECTS OF AVOIDANCE

These data have clear implications for smoking cessation interventions that are organised around avoidance and escape-based cognitive, emotional, and behavioural coping strategies. They suggest that a comprehensive explanation for why many people do not benefit from CBST may require not only an understanding of the roles of negative affect, withdrawal symptoms, and social learning mechanisms, but also of the role of paradoxical effects of experiential avoidance. Several researcher-practitioners have suggested that if smokers' efforts to suppress attention to internal smoking cues do paradoxically enhance the salience of these 'suppressed' cues, then smoking cessation interventions which emphasise the client's need to avoid, alter, and substitute his/her internal smoking cues may, in some case, actually fuel attention to the very cues which enhance these clients' motivation to smoke. However, little is known about the extent to which smokers differ in their tendency to experience paradoxical effects of experiential avoidance, how best to measure such

differences, and ultimately, whether the paradoxical tendencies shown by smokers under laboratory condition predict their success of using the coping skills that are taught in CBST.

6.7. MEASURING INDIVIDUAL DIFFERENCES IN PARADOXICAL TENDENCY

Since research has focused almost exclusively on the nature and promoting conditions of paradoxical effects of experiential avoidance, little is known about the extent to which individuals differ in their tendencies to show paradoxical effects of thought, emotion, and behaviour suppression, or about the extent to which these paradoxical tendencies vary as a function of the context in which avoidance is being performed. Interest in these areas has been sparked in recent years, however, by an emerging literature, albeit small and as yet limited to motor control studies, which suggests that instructing participants to avoid doing a particular behaviour leads some to individuals to show the behaviour opposite to that which was to be avoided (i.e. an overcompensatory effect) and others to show the behaviour that was to be avoided (i.e. the paradoxical effect).

Russell and Grealy (2010) tasked 40 participants to trace a straight line between two black dots on a computer screen, the end-points of an invisible 18.8cm line, using a computer mouse, under instruction to either 'trace the line as accurately as possible' (control instruction), 'avoid moving to the left of the line', or 'avoid moving to the right of the line'. A seven-digit number was to be memorised on half of trials (high cognitive load condition). Results showed that cognitive load, 26[11] participants consistently made overcompensatory movements (i.e. moved to the left when instructed 'not right' and moved to the right when

[11] See Russell and Grealy (2010) for a detailed description of the classification procedure.

instructed ‘not left), ten participants consistently made paradoxical movements (i.e. moved to the left when instructed ‘not left’ and moved to the right when instructed ‘not right’), and four participants consistently showed no left-right movement bias. However, when the cognitive load was imposed, 21 participants (52.5%) changed their movement tendency; there were now fifteen consistent overcompensatory participants, twelve consistent paradoxical participants, and thirteen no-bias participants. Similar ratios of paradoxical to overcompensatory performers were previously found on a golf-putting task (de la Pena, Murray, & Janelle, 2008; Binsch, Oudejans, Bakker & Savelsbergh, 2009).

The main implication of these findings is that paradoxical and overcompensatory effects of avoidance instruction were not experienced uniformly by participants; they were experienced very differently between individuals, which gives a rationale to expect that there may also be important differences in how well smokers are able to ‘do avoidance’ as part of their quit plan. Specifically, it is proposed that some smokers may be especially vulnerable to doing precisely what try to avoid (e.g. noticing cues to negative affect when trying to distract attention from these cues) while others may overcompensate by ‘hyper-avoiding’ smoking cues (e.g. withdrawing from valued activities and relationships in order to make it physically impossible to come into contact with reminders of smoking). Developing methods and assessment tools to reliably identify these individuals at first contact would be an important step to matching clients to a therapy model that is theoretically better suited to their abilities to avoid unwanted experiences.

CHAPTER SEVEN: STUDY AIMS AND HYPOTHESES

7.1. AIMS

The present study had three aims: (i) to compare the efficacy of two streamlined, group-based behavioural interventions for long-term smoking abstinence: traditional cognitive-behavioural coping skills training (CBST) and a smoking-focussed version of Acceptance and Commitment Therapy (ACT); (ii) to assess any mediation of long-term smoking outcomes by the theoretically-distinct mechanisms of action underlying each intervention; and (iii) to assess any moderation of each intervention's efficacy for smoking abstinence by participants' tendencies to experience paradoxical effects of avoidance instructions.

7.2. HYPOTHESES

Systematic reviews and meta-analyses of behavioural interventions for smoking cessation have yielded mixed efficacy findings for interventions which focussed on developing clients' skills for avoiding and coping with smoking triggers, whereas positive efficacy findings for smoking-focused ACT in well-controlled comparisons remain sparse and preliminary. Therefore, no predictions were made about whether CBST or ACT would produce more abstinent smokers at three and six months post-quit. Several hypotheses were made, however, about how secondary variables would mediate and moderate the relationship between each intervention and smoking outcomes.

We hypothesised that smoking abstinence following CBST would be more strongly mediated by increased use of coping skills at post-intervention. Specifically, we predicted

that CBST would increase use of coping skills at post-intervention compared to ACT, and that higher levels of coping would increase the likelihood of smoking abstinence among CBST compared to ACT recipients. In contrast, we hypothesised that smoking abstinence following ACT would be more strongly mediated by a reduction in avoidance responding to internal smoking cues (thoughts, feelings, and cravings). Specifically, we predicted that ACT would reduce avoidance responding compared to CBST, and that lower avoidance responding would increase the likelihood of smoking abstinence among ACT recipients than among CBST recipients.

Finally, we hypothesised that participants would differ in their tendency to show paradoxical behaviour under avoidance instruction on four behavioural tasks completed prior to randomisation to CBST or ACT, and that these paradoxical tendencies would moderate the therapeutic benefit of avoidance-based and acceptance-based behavioural interventions for smoking cessation. Specifically, we predicted that the participants who show higher frequencies of paradoxical error on the behavioural tasks (i.e. a stronger tendency to show paradoxical behaviour under avoidance instruction) would be more likely to achieve smoking abstinence with ACT than with CBST.

CHAPTER EIGHT: STUDY METHOD

8.1. PARTICIPANTS

Two-hundred and twelve individuals responded to study advertisements and were telephone screened to determine their eligibility to participate based on study inclusion and

exclusion criteria (Appendix A). Of these 212, 133 either dropped out or were excluded prior to randomisation: 23 withdrew their interest upon discovering that pharmacotherapy was not being offered; ten were currently using some form of NRT or another pharmacotherapeutic aid-to-cessation; fifteen could not commit to study's time demands; three friends wished to participate only as a trio; 21 did not meet nicotine dependence criteria; fifteen did not wish to complete the experimental (i.e. pre-intervention) phase of the study; 25 did not show for their appointment to complete the experimental phase and could not be re-contacted thereafter; and 21 completed the experimental phase but could not be re-contacted thereafter. This left 79 who were eligible to participate, completed the experimental phase, and randomised to either the CBST or ACT intervention (see figure 1). An intent-to-treat (ITT) sample of 79 very closely resembled those reported in two recent ACT trials for smoking cessation (N = 76, Gifford et al., 2004; N = 81, Hernandez-Lopez et al., 2010).

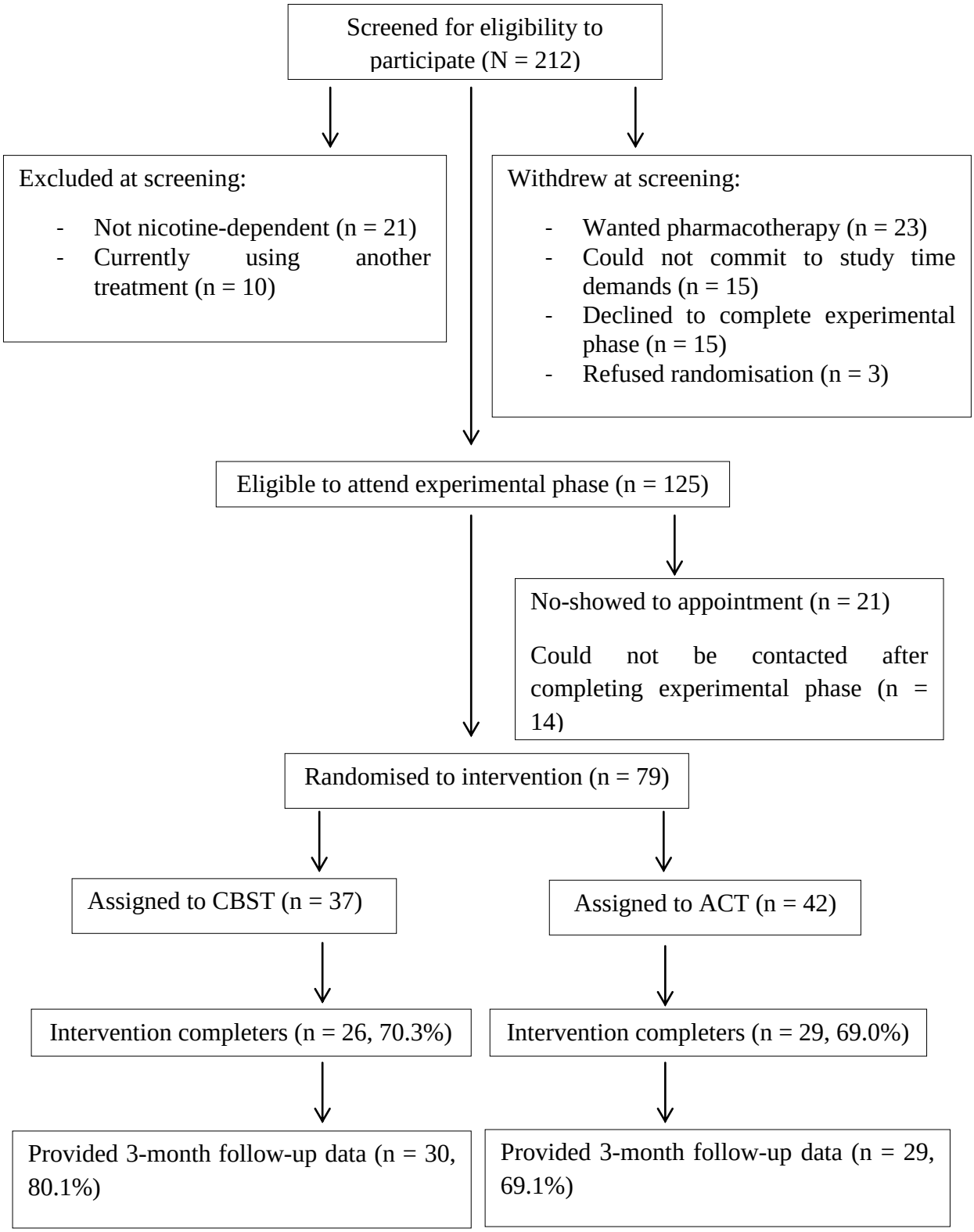


FIGURE 1. CONSORT DIAGRAM OF THE SCREENING, ELIGIBILITY, ASSIGNMENT, AND FOLLOW-UP OF STUDY PARTICIPANTS.

8.2. RECRUITMENT AND SCREENING

Adult nicotine dependent smokers were recruited from Glasgow and surrounding areas in five ways: (i) online via the University of Strathclyde's intranet system accessible by all faculty staff and students; (ii) online via a Facebook[12] page; (iii) online via free, regularly re-posted advertisements on the 'Glasgow' pages of Gumtree [13] ; and (iv) poster advertisements placed in university and student accommodation buildings, municipal buildings (local council premises, community centres, leisure centres, libraries, churches) and corporate buildings (shopping centres, department stores, supermarkets, coffee shops, call centres) in Glasgow city centre and surrounding areas. Study advertisements called for adult smokers with a desire to quit to attend three, consecutive weekly, two-hour, tutor-led meetings with four to eight other smokers, free of charge.

During telephone screening, potential participants were informed that they would be required to complete a 70-minute intake assessment, which involved completing four computer tasks in a laboratory at the University, before being randomly assigned to receive one of two types of smoking cessation therapy. They were told that both therapies were delivered to small groups of quitting smokers and led by a doctoral psychology student as part of a research study being conducted under the supervision of a Professor of Psychology at the University of Strathclyde.

[12] www.facebook.com

[13] www.gumtree.co.uk

They were informed that therapy meetings would be held most weekday evenings, with start times scheduled by the meeting leader according to group members' preferences, and that there would likely be a short waiting time (one to two weeks) between the completion of the experimental phase and their first therapy meeting.

After screening, eligible participants were invited to the psychology laboratory at the University of Strathclyde to complete the experimental phase. Upon arrival at the laboratory, it was explained to participants that the purpose of this phase was 'to investigate whether matching smokers to a quit plan on the basis of their performances on four computer tasks improves their chances of quitting smoking'. This information was kept deliberately vague to prevent a 'good participant' effect.

CHAPTER NINE: THE EXPERIMENTAL PHASE

9.1. OVERVIEW

Four novel computer tasks were developed to examine individual differences in paradoxical and overcompensatory behaviour under instructions to avoid making specific errors in each of four skill domains: motor control (MC), motion timing (MT), visual search (VS), and recognition memory (RM). The goal of administering these tasks prior to the intervention phase was to identify dependent variables on which participants showed substantial differences, and to then test these variables as

statistical moderators of the effect of intervention (CBST vs. ACT) on smoking outcomes. Participants completed the four tasks, in a randomised order, in approximately 70 minutes inclusive of two-minute rest intervals in between tasks. The method and results for each task are described below. Results are described for only the 79 participants who were subsequently randomised to CBST or ACT.

9.2. TASK ONE: MOTOR CONTROL (MC)

9.2.1. METHOD

9.2.1.1. DESIGN

Participants completed all conditions of a three (instruction type: 'move straight only' vs. 'not left' vs. 'not right') X two (cognitive load: no load vs. higher load) repeated-measures, randomised block design. The nominal dependent variable was a classification of participants' task performance as paradoxical, overcompensatory, neutral, or inconsistent.

9.2.1.2. MATERIALS

The task was created using LabView 8.2 software (National Instruments, 2006) and performed on an Intel Core 2 Duo PC connected to a 38cm Active Matrix LCD colour monitor using a wired mouse. Monitor resolution was 1280 X 960 pixels. Pre-recorded audio instructions were played through wired headphones. The

task screen showed a black circle (Ø = 18.80cm) set against a light grey background with two black dots positioned at the uppermost and lowermost edges of the circle to indicate the end points of an invisible vertical line which connected through the centre of the circle.

9.2.1.3. PROCEDURE

Participants were seated such as that viewing distance from the screen was approximately 50cm. Participants were told that their primary objective for this experiment was to imagine the invisible straight line connecting the two dots and to move the mouse cursor back and forth between these dots, tracing this line as accurately as possible. They were asked to make approximately one dot-to-dot movement per second, to move at a steady, fluent pace, and to reverse movements at each dot. They were told that the software was recording their movement velocity and points of reversal to check their adherence to these instructions. Participants were instructed to use the hand which they normally use to operate a computer mouse.

Participants were also told they would receive additional instructions to avoid making specific movements prior to some blocks of trials. It was emphasised that obeying these avoidance instructions was of secondary importance to their objective of accurately tracing the line and that avoidance instructions were not feedback for performance on previous trials. Prior to ‘move straight only’ instruction blocks, participants were instructed: “For this block of trials, imagine an invisible straight

line connecting the two black dots and move the mouse cursor back and forth between these dots, tracing as straight a line as possible. The first trial will start momentarily". The command "ready, set, go" was played and movement began. After six seconds the "stop!" command was played, at which point the participant rested the mouse cursor on one of the black dots and waited for further instruction. A reminder instruction, "remember, you must trace the line as accurately as possible", followed by "ready, set, go!" then played. This process repeated until the six trials in the block were completed.

Prior to 'not left' instruction blocks, participants were instructed: "For this block of trials, you must not make any movements to the left of the line. Do not move to the left of the line!" A reminder instruction was played between trials: "remember, you must not move to the left of the line. Do not move left of the line!" The same initial and reminder instructions were given on the 'not right' instruction blocks, with the exception of being instructed to 'not move right of the line'.

Participants were randomly assigned to complete these three instruction blocks first under no cognitive load and then again under higher cognitive load, or vice versa. Prior to instruction blocks in the higher cognitive load condition, participants were shown a seven-digit number string printed on a sheet of A4 paper for seven seconds. Participants were told they would be asked to recall this number in serial order at the end of the trial block and so they should rehearse this number in their heads while also following their audio instructions as best as possible. The experimenter gave verbal feedback on their recall accuracy following each block and recorded accuracy in a notepad in view of the participant to give the impression this was important to the investigation.

Testing commenced once participants indicated they understood their instructions and lasted approximately eight minutes per participant. With approximately six dot-to-dot movements made per trial, six trials in each instruction block, three instruction blocks per cognitive load condition, and two cognitive load conditions, each participant made an approximate total of 216 dot-to-dot movements.

9.2.1.4. ANALYSIS OF DOT-TO-DOT MOVEMENTS

The start point and end point of each dot-to-dot movement was measured at the points at which movement velocity became greater than 0cm/s and fell back to 0cm/s (i.e. the point at which the mouse cursor began to reverse on itself). LabView 8.2 software calculated the horizontal distance (mm) between the mouse cursor position and the target vertical line at 200 Hz for each dot-to-dot movement. This gave the number and size of leftward deviations and rightward deviations made on each dot-to-dot movement. The total size of leftward deviations were then summed and divided by the number of leftward deviations to give the mean leftward deviation score for each dot-to-dot movement. The same procedure was conducted to produce the mean rightward deviation score for each dot-to-dot movement.

The mean leftward deviation score and mean rightward deviation score for each dot-to-dot movement was then used to classify each movement as paradoxical, overcompensatory or neutral. Participants' percentages of paradoxical, overcompensatory and neutral movements made in each load condition were then calculated, which in turn were used to calculate the percentage of participants classed

as having shown paradoxical, overcompensatory, neutral and inconsistent performance in each load condition. The procedure by which participants were then classified into performance groups is described in section 9.2.1.5.

Seven other kinematic properties of participants' movement were recorded on each dot-to-dot movement: velocity (cm/s); peak velocity (cm/s); duration (s); amplitude (Hz); distance (cm); reversal accuracy at the upper and lower dot (SD around mean reversal co-ordinate). As participants' dot-to-dot movements were self-paced, data on these variables were analysed to check the validity of left-right deviation data.

9.2.1.5. ANALYSIS OF INDIVIDUAL DIFFERENCES: PARTICIPANT CLASSIFICATION CRITERIA AND PROCEDURE

A three-step procedure was used to classify each participant into one of four distinct performance groups in each cognitive load condition, based on their percentages of movements classed as paradoxical, overcompensatory, and neutral. First, participants' paradoxical and overcompensatory deviation scores (cm) were calculated by subtracting their mean leftward and mean rightward deviation scores from their respective mean leftward and mean rightward deviation scores made on each dot-to-dot movement in the two avoidance instruction ('not left' and 'not right') conditions. This left participants with residual deviation scores which indicated the true effect of each avoidance instruction. Paradoxical deviation was indicated by the leftward deviation score in the 'not left' condition and by the rightward deviation

score in the 'not right' condition. Overcompensatory deviation was indicated by the rightward deviation score in the 'not left' condition and by the rightward deviation score in the 'not left' condition.

Next, two arbitrary statistical criteria were used to classify each dot-to-dot movement in each load condition (approximately 36 per condition) as indicating either a paradoxical, overcompensatory, or neutral error. In the 'not left' condition, a paradoxical error was indicated by a leftward deviation score which was both greater than 0.5 standard deviations[14] (SD) from the participant's mean leftward deviation score in the 'move straight' (control) condition *and* by a leftward deviation residual[15] score that was greater than the rightward deviation residual[16] score for that movement. An overcompensatory error was indicated by a rightward deviation score that was both greater than 0.5 SDs from the participant's mean rightward deviation score in the 'move straight' (control) condition *and* by a rightward deviation residual score that was greater than the leftward deviation residual score for that movement. Failure to satisfy either sets of criteria resulted in classification as a neutral error. The same procedure and criteria were then used to classify each dot-to-dot movement made in the 'not right' condition, with the exceptions that larger rightward deviations

[14] The use of deviation scores that were equal to or greater than 0.5 SDs from participants' baseline mean scores is a stricter classification criterion than the "greater than baseline", "greater than 0.44 SDs", and greater than 0.5 SDs" criteria respectively used by to classify golf putts (de la Pena et al., 2008; Binsch et al., 2009) and soccer penalty kicks (Binsch, Oudejans, Bakker & Savelsbergh, 2010) as indicating either paradoxical, overcompensatory, or accurate performance under similar avoidance instructions. Cut-off points of 1 SD, 1.5 SDs and 2 SDs were trialled but each resulted in the majority (>84%) of movements being classified as 'neutral' and so were deemed too strict for the purpose of detecting sensitive instruction effects upon individual movements.

[15] The residual of the sum of the overall mean leftward deviation in the 'not left' condition minus the overall mean leftward deviation in the baseline instruction condition.

[16] The residual of the sum of the overall mean rightward deviation in the 'not left' condition minus the overall mean rightward deviation in the baseline instruction condition.

now indicated paradoxical errors and larger leftward deviations now indicated overcompensatory errors. Frequencies of paradoxical, overcompensatory, and neutral errors were then summed in each load condition and expressed as percentages for each participant.

Next, four arbitrary criteria, adapted from Russell and Grealy (2010), were used to classify each participant as having shown one of four distinct performance types – paradoxical, overcompensatory, neutral, or inconsistent – in each load condition. Classifications (nominal data) were used as the measure of individual differences here because the research question concerned individual differences in *predominant* error tendencies, meaning that some cut-off point was required to define 'predominant'.

Each participant was classified as follows: first, the most frequent error type (paradoxical, overcompensatory or neutral) in the load condition indicated the participant's initial class; second, the participant remained in this class if he/she made this error type on ≥50% of all movements in the load condition; third, the participant remained in this class if he/she made this error type on ≥40% of all movements in the 'not left' condition *and* ≥40% of all movements the 'not right' condition within the load condition; and fourth, the participant remained in this class if each of the frequencies of the two less frequent error types each accounted for ≤40% of all movements in the condition. Failure to satisfy any criterion resulted in classification as an inconsistent performer[17]. Thus, the minimum requirement for classification as, for example, a paradoxical performer, was to have made ≥50%

[17] Inconsistent performers were those whose movements were approximately evenly distributed between the three effect types (e.g. 35% paradoxical; 40% overcompensatory; 25% neutral). This pattern was taken as evidence of no consistent motor bias.

paradoxical errors *and* ≤40% overcompensatory errors *and* ≤40% neutral errors in the load condition. In comparison to criteria used to classify participants' into performance groups on previous motor control studies (de La Pena et al., 2008; Binsch et al., 2009), the present criteria are believed to be strict but sensible for the purposes of examining individual differences in the present sample.

9.2.1.6. HYPOTHESES AND ANALYSIS PLAN

The literatures on paradoxical and overcompensatory processing suggest three alternative hypotheses regarding how avoidance instructions and cognitive load in this task may interact to influence participants' mouse control. Wegner (1994a) suggests that participants should perform the task well when under conditions of no cognitive load, but then shift to making paradoxical (i.e. to-be-avoided) movements when cognitive load is increased. Alternatively, de la Pena et al. (2008) suggest that the avoidance instructions will prioritise the importance of the movements that are to be avoided and so bias participants to overcompensate their movement away from the to-be-avoided area regardless of their cognitive load. A third alternative suggested by Russell and Grealy (2010) states that there will be important participant differences in paradoxical and overcompensatory performance within each load condition. Specifically, avoidance instructions should lead some participants to show paradoxical performance (a majority of movements in to-be-avoided directions), others to show overcompensatory performance (a majority of movements in the directions opposite to those which were to-be-avoided), others to show neutral

performance (a majority of on-target movements), and others to show inconsistent performance (no majority of paradoxical, overcompensatory, or neutral movements).

To test these hypotheses, repeated measures logistic regression analyses, using multinomial generalised estimating equations (MGEE), were used to compare the odds of each classification type in each load condition, i.e. does the difference between the proportions of classification A versus classification B change as a function of cognitive load?

9.2.2. RESULTS

Data analysis proceeded in three steps: first, classification frequencies were compared; second, validation checks of each class' kinematic data and baseline deviation scores were conducted; third, the effect of cognitive load on classification type was examined.

9.2.2.1. CLASSIFICATION DIFFERENCES

With 79 participants classified into a performance type each cognitive load condition, a total of 158 classifications were made. When applied to movement data in the no load condition, the classification procedure yielded 31 (39.24%) overcompensatory performers, 26 (32.91%) inconsistent performers, thirteen (16.45%) neutral performers, and nine (11.39%) paradoxical performers. When

applied to movement data in the higher load condition, the classification procedure yielded 41 (51.90%) inconsistent performers, nineteen (24.05%) neutral performers, eleven (13.92%) paradoxical performers, and eight (10.13%) overcompensatory performers. The finding that overcompensatory performance was the most common type only in the no load condition provides partial support for de la Pena et al.'s (2008) hypothesis. No support was found for Wegner's (1994a) hypothesis that paradoxical performance should markedly increase with cognitive load. More than half of participants (50.63%) showed either paradoxical or overcompensatory performance in the no load condition compared to only 24.05% in the higher load condition, suggesting that cognitive load was a potent suppressor of paradoxical and overcompensatory processing tendencies.

This distribution of participants across the four classes in each load condition indicated potentially important individual differences in how avoidance instructions were processed and effected in motor control. Next, it was necessary to check that (a) participants had adhered to movement speed and fluency instructions; (b) and that the classification groups had performed similarly on kinematic variables (c) and made similar magnitudes of leftward and rightward deviation in the 'move straight' (baseline) instruction conditions.

9.2.2.2. DATA VALIDATION CHECKS

As movements on this task were self-paced, it was necessary to check that participants had adhered to the instruction to "move back and forth between the two

black dots at a constant speed, making approximately one dot-to-dot movement per second". Given the distance of 18.80cm between the two black dots, acceptable adherence was *a priori* defined as: (1) mean movement velocity = 18.80 cm/s ± 1cm/s; (2) mean movement duration = 1s ± 0.20s; (3) mean movement distance, 18.80cm ± 1cm, and; (4) standard deviations from the upper and lower dots ≤ 2. Descriptive statistics shown in table 1 confirmed that participants' movements fell within the acceptable limits on all kinematic variables in all conditions.

TABLE 1. MEANS (STANDARD DEVIATIONS) FOR SEVEN KINEMATIC PROPERTIES OF PARTICIPANTS' MOVEMENTS IN EACH OF THE TWO (COGNITIVE LOAD) X THREE (INSTRUCTION) CONDITIONS.

Load	Instruction	Kinematic Variables						
		V	PV	Dr	A	U	L	Ds
HL	Move Straight	18.01 (1.72)	19.31 (2.26)	1.05 (0.12)	19.23 (0.31)	1.43 (0.74)	0.74 (0.33)	18.47 (0.46)
HL	Not Left	18.87 (2.02)	20.59 (2.50)	1.00 (0.11)	19.22 (0.45)	1.48 (0.80)	0.64 (0.32)	18.47 (0.48)
HL	Not Right	18.97 (1.82)	20.65 (2.00)	0.99 (0.11)	19.15 (0.34)	1.53 (0.67)	0.66 (0.31)	18.38 (0.37)
NL	Move Straight	18.11 (1.79)	19.18 (2.40)	1.06 (0.12)	19.30 (0.39)	1.41 (0.74)	0.70 (0.34)	18.54 (0.50)
NL	Not Left	18.83 (1.94)	20.42 (2.13)	1.01 (0.12)	19.30 (0.51)	1.65 (0.76)	0.69 (0.37)	18.43 (0.56)
NL	Not Right	18.95 (2.10)	20.65 (2.20)	1.00 (0.13)	19.25 (0.45)	1.47 (0.73)	0.73 (0.32)	18.49 (0.51)

Key: V = velocity (cm/s); PV = peak velocity (cm/s); Dr. = duration (s); A = amplitude (Hz); U = standard deviation around the upper dot; L = standard deviation around the lower dot; Ds = distance (cm).

Second, to check for significant kinematic differences between the classification groups, a classification type (4) X instruction type (3) mixed-design ANOVAs was conducted on these seven kinematic dependent variables, separately for each load condition. The only significant main effect of classification type was found for movement amplitude in the higher load condition (F (3, 75) = 3.19, p = 0.024, partial η^2 = .09). *Post-hoc* Tukey HSD tests showed that inconsistent performers' mean movement amplitude was 0.46cm larger than that of overcompensatory performers (p = 0.020). Importantly, paradoxical, overcompensatory, and neutral performers did not significantly differ on any kinematic variable in either load condition. These null findings confirmed that participants' differing tendencies to make paradoxical, overcompensatory, and neutral errors in each load condition were not related to differences in the kinematic properties of their movements.

Finally, to check whether classification had made comparable deviation magnitudes at baseline, classification type (4) X deviation direction (2) mixed-design ANOVAs were conducted on baseline mean deviation scores, separately for each load condition. Results again showed that only the inconsistent classes in each load condition made significantly larger magnitudes of leftward deviation than rightward deviation in 'move straight' conditions. Neither of the paradoxical, overcompensatory, or neutral classes in either load condition showed a significant baseline directional bias.

In summary, validation checks confirmed that the classification differences yielded by our criteria were not attributable to participants' kinematic differences or natural movement biases in operating a computer mouse. In turn, these null findings increase confidence in the conclusion that classification differences were due to individual differences in processing avoidance instructions. These individual differences did not, however, necessarily rule out a potentially important role for cognitive load in determining

how likely participants were to make a majority of paradoxical and overcompensatory movements. The next step was to examine the effect of cognitive load on classification frequencies.

9.2.2.3. CLASSIFICATION DIFFERENCES BETWEEN COGNITIVE LOAD CONDITIONS

Classification criteria yielded more overcompensatory performers than paradoxical performers in the no load but not the higher condition. The effect of cognitive load on classification type was tested by fitting repeated measures logistic regression equations, using multinomial generalized estimating equations (MGEEs)[18] to classification frequencies. A cumulative logit function and an exchangeable correlation structure [19] were used. Cognitive load (higher load = 0, no load = 1) was entered as a repeated measures predictor variable. The dependent variable, classification type, was coded 1 to 4 (overcompensatory = 1; inconsistent = 2; neutral = 3; paradoxical = 4), with the paradoxical classification code used as the reference category as this was the least frequent classification type overall.

[18] Liang and Zeger (1986) introduced binary GEEs (BGEE) as an extension of generalized linear models to correlated data. Lipsitz, Kim & Zhao (1994) extended the BGEE to model correlation between repeated multinomial categorical responses (MGEE). A MGEE fits a regression model to repeated-measures categorical data where the predictors are categorical and can be repeated-measures. Though not widely used in the educational and social sciences, MGEEs are appropriate for "analysing data that arise from a longitudinal, repeated measures or clustered design, and there exists correlation between observations on a given subject", i.e. when data violate the statistical assumption about independent observations of traditional regression methods (Horton & Lipsitz, 1999: 160). Despite the common practice among social scientists to express categorical data as counts and then as percentages between categories for the purpose of conducting ANOVAs over arcsine-transformed percentages, Jaeger (2008) provide compelling theoretical and empirical arguments against this practice.

[19]The exchangeable correlation specification was used because the multinomial responses for each individual were assumed to be equally correlated.

The full model revealed a significant main effect of load on classification type (Wald $\chi^2 = 16.05$, $p < 0.001$). To explore this effect, the model produced three binary logistic regression equations for the three alternative comparisons: 1 vs. 4; 2 vs. 4; 3 vs. 4. A significant effect of cognitive load was found for the comparison of overcompensatory versus paradoxical classifications (Wald $\chi^2 = 11.55$, $\beta = 0.66$, SE = 0.46, $p = 0.001$). Participants were 4.2 times more likely to show overcompensatory performance under no load (39.24% vs. 11.39%). Cognitive load did not significantly affect the probabilities of inconsistent versus paradoxical classification (Wald $\chi^2 = 0.46$, $\beta = 1.00$, SE = 0.37, $p = 0.499$) or the probabilities of neutral versus paradoxical classification (Wald $\chi^2 = 0.18$, $\beta = 0.18$, SE = 0.42, $p = 0.673$). As a final check, the MGEE and follow-up binary logistic regressions were re-run using the autoregressive-one specification instead of the exchangeable specification, with similar results found.

In summary, results of the MGEE supports Russell and Grealy's (2010) hypothesis that individuals markedly differ in their tendency to show paradoxical and overcompensatory behaviour under avoidance instruction, with differences significantly pronounced in the 'no load' condition of this motor control task. Therefore, participants' percentage of paradoxical movements in the 'no load' condition was selected to be tested as a statistical moderator of the effect of intervention on smoking outcomes.

9.3. TASK TWO: MOTION TIMING (MT)

9.3.1. METHOD

9.3.1.1. DESIGN

Participants completed the conditions of a three (instruction type: 'stop on centre-spot only' vs. 'don't stop early' vs. 'don't stop late') X two (cognitive load: no load vs. higher load) repeated-measures, randomised block design. The nominal dependent variable was a classification of participants' task performance as paradoxical, overcompensatory, neutral, or inconsistent.

9.3.1.2. MATERIALS AND STIMULI

The task was performed on an Intel Core 2 Duo PC connected to a 38cm Active Matrix LCD colour monitor. Monitor resolution was 1280 X 960 pixels. The experiment was created and run using E-Prime 2.0 Professional Edition software (Schneider, Eschman, & Zuccolotto, 2002). A Cedrus RB-730 Response Pad with a 1ms reaction time resolution was used to record participants' timing estimates. Pre-recorded audio instructions were played through wired headphones.

The experiment used a JPEG image of a purple tennis ball (Ø = 3cm) set against a black background screen as the moving stimulus. The horizontal axis of the task screen was divided into 2.5%[20] intervals, with 0% and 100% indicating the left and right edges of the screen respectively. To convey this ball's apparent left-to-right motion, the JPEG image flashed on-off for 100ms at six consecutive intervals (5%, 7.5%, 10%, 12.5%, 15%, and

[20] A 2.5% interval = 1cm. Interval distances are described in percentages rather than centimetres to allow other researchers to use our specifications when using computer monitors of a different size.

17.5%), remained off for 2500ms[21], then flashed on-off for 100ms at a further six consecutive intervals (82.5%, 85%, 87.5%, 90%, 92.5%, and 95%). After a 500ms delay, this process reversed to convey the ball's apparent right-to-left motion. The ball re-appeared from the 2500ms period of occlusion at the X-axis position it would have reached had it continued to flash on-off for 100ms at 2.5% intervals, thus giving the illusion of the ball's continuous motion at a constant speed. Additionally, the effect of a rolling ball was conveyed by rotating the JPEG image clockwise by 60° degrees at each 2.5% interval for left-to-right screen crossings and anti-clockwise by 60° degrees at each 2.5% interval for right-to-left screen crossings, which equated to a full ball rotation (60° X 6 intervals = 360°) at the beginning and end of each screen crossing.

9.3.1.3. PROCEDURE

Participants were seated such as that viewing distance from the screen was approximately 50cm. They viewed a purple tennis ball rolling out from the left edge of the computer screen, disappearing for a short time as it passed through the middle third of the screen "as if it had rolled behind a wall", before re-appearing as if "rolling out from behind this wall" and continuing to roll rightwards until it rolled off the right edge of the screen. After a brief delay, the ball re-emerged from the right edge of the screen and rolled leftwards, disappeared as it passed behind the 'wall' again, then re-appeared from behind the 'wall' and continued to roll leftwards until it rolled off the left edge of the screen. The ball made a further six screen crossings in each block. Participants were told that their primary

objective in this experiment was to press the '1' key on the Response Pad with their dominant index finger when they estimated that the tennis ball was on the occluded centre-spot of the screen. They were told to use the speed of the rolling ball before it disappeared to gauge the ball's position as it rolled through the occluded section of the screen. They were told that they would not receive verbal or visual feedback on the accuracy of each timing estimate (so as to minimise training effects) but that the software was recording the accuracy of their timing estimates. Though the ball always disappeared for a 2500ms period, they were told that the length of disappearance varied in each instruction block. They were told to make one centre-spot estimate for every time the ball crossed the screen.

In addition to their primary objective of estimating when the ball was at the centre-spot, participants were told they would receive additional instructions to avoid making specific timing errors prior to some blocks of trials. It was emphasised that obeying these avoidance instructions was of secondary importance to their objective of estimating when the ball was at the centre-spot and that avoidance instructions were not feedback for performance on previous trials.

Prior to the 'stop on centre-spot only' instruction blocks, participants were instructed: "For this block of trials, press the button when you think the ball is on the centre-spot of the screen". Prior to "don't stop early' instruction blocks, participant were instructed: "For this block of trials, press the button when you think the ball is on the centre-spot of the screen but do not press the button early". The same instruction was given prior to 'don't stop late' instruction blocks with the exception of now being instructed "do not press the button early". The first trial of the block began 2 seconds after the instruction had finished playing. On-screen instructions had explained to participants that 'early' referred to pressing button

before the ball had reached the centre-spot and ‘late’ referred to pressing button after the ball had passed the centre-spot.

Prior to the half of trial blocks, participants were given the additional task of holding a seven-digit number string in memory for the duration of the trial block (higher cognitive load condition). Prior to each of these trial blocks a message appeared on-screen; “Please remember the number [seven-digit number]”. Participants were told that the program would ask them to type this number in serial order at the completion of the trial block and so they should rehearse this number in their heads throughout the block while also following their audio instructions as best as possible. Participants were told that the program recorded their recall accuracy to give the impression this was important to the investigation.

Participants completed two practice trial blocks under ‘stop on centre-spot only’ instruction in the higher cognitive load condition to familiarise themselves with the task. The task commenced once participants indicated they understood their instructions and took approximately 16 minutes to complete inclusive of a 2 minute break after half of trial blocks. Eight centre-spot estimates per instruction block, nine instruction blocks (3 x ‘move straight only’, 3 x ‘not early’ and 3 x ‘not late’) per cognitive load condition, and two cognitive load conditions gave a total of 144 centre-spot estimates per participant.

9.3.1.4. Analysis of individual differences: Participant classification criteria and procedure

A two-step procedure was employed to quantify the extent of individual differences in paradoxical and overcompensatory processing tendencies on this task. First, participants’

timing estimates were classified as either paradoxical, overcompensatory, or neutral as follows. When instructed ‘not early’, a timing estimate which was less (earlier) than that participant’s mean timing estimate in the ‘stop on centre-spot only’ instruction conduction (i.e. baseline) *minus* 0.5 standard deviations (SD) was classified as a paradoxical error; a timing estimate which was greater (later) than that participant’s mean timing estimate in the ‘stop on centre-spot only’ instruction conduction *plus* 0.5 SDs was classified as an overcompensatory error; and a timing estimate equal to or within 0.5 SDs of the mean of that participant’s estimates made in the ‘stop on centre-spot only’ instruction condition was classified as a neutral effect. The same logic was then used to classify each timing estimate made under ‘not late’ instruction, with the exceptions that later estimates now indicated paradoxical errors and earlier estimates now indicated overcompensatory effects. Frequencies of paradoxical, overcompensatory, and neutral errors were then summed and expressed as percentages for each participant within each avoidance instruction condition.

These percentages were then used to classify each participant into one of four distinct performance groups in each cognitive load condition as follows: first, the most frequent error type (paradoxical, overcompensatory or neutral) in the load condition indicated the participant’s initial class; second, the participant remained in this class if he/she made this error type on ≥50% of all timing estimates in the load condition; third, the participant remained in this class if he/she made this error type on ≥40% of all timing estimates in the ‘not early’ condition *and* ≥40% of all timing estimates the ‘not late’ condition within the load condition; and fourth, the participant remained in this class if each of the frequencies of the two less frequent error types each accounted for ≤40% of all timing estimates in the condition. Failure to satisfy any criterion resulted in classification as an inconsistent performer. Thus, the minimum requirement for classification as, for example, a

paradoxical performer, was to have made ≥50% paradoxical errors *and* ≤40% overcompensatory errors *and* ≤40% neutral errors in the load condition.

9.3.1.5. HYPOTHESES

The same three alternative hypotheses described in section 9.2.1.6. were tested with regard to how avoidance instructions and cognitive load may interact to influence participants' timing of the tennis ball's motion across the computer screen.

9.3.2. RESULTS

Data analysis proceeded in two steps: first, classification frequencies were compared; and second, the effect of cognitive load on classification type was examined.

9.3.2.1 CLASSIFICATION DIFFERENCES

When applied to timing data in the no load condition, the classification procedure yielded 39 (49.37%) inconsistent performers, 25 (31.65%) overcompensatory performers, nine (11.39%) paradoxical performers, and six (7.59%) neutral performers. When applied to timing data in the higher load condition, the classification procedure yielded 45 (56.69%)

inconsistent performers, 13 (16.46%) overcompensatory performers, 11 (13.92%) neutral performers, and 10 (12.66%) paradoxical performers.

9.3.2.2. INTER-INDIVIDUAL CLASSIFICATION VARIABILITY BETWEEN CONDITIONS

The effect of cognitive load on classification type was again tested by fitting MGEEs to classification frequencies. A cumulative logit function and an exchangeable correlation structure were used. Cognitive load (higher load = 0, no load = 1) was entered as a repeated-measures predictor variable. The dependent variable, classification type, was coded 1 to 4 (overcompensatory = 1; paradoxical = 2; inconsistent = 3; neutral = 4), with the neutral classification code used as the reference category as this was the least frequent classification type overall.

The full model revealed a significant main effect of load on classification type (Wald $\chi^2 = 6.43$, $p < 0.001$). To explore this effect, the model produced three binary logistic regression equations for the three alternative comparisons: 1 vs. 4; 2 vs. 4; 3 vs. 4. A significant effect of cognitive load was found for the comparison of overcompensatory versus neutral classifications (Wald $\chi^2 = 5.41$, $\beta = 1.26$, SE = 0.54, $p = 0.020$). Participants were 3.6 times more likely to show overcompensatory performance in the 'no load' condition (31.65% vs. 7.59%). A significant effect of cognitive load was also found for the comparison of overcompensatory versus inconsistent classifications (Wald $\chi^2 = 5.29$, $\beta = 0.80$, SE = 0.34, $p = 0.021$). Participants were 4.2 times more likely to show inconsistent performance in 'higher load' condition (56.69% vs. 16.46%). However, no significant effect of cognitive load was found for the comparison of overcompensatory versus paradoxical

classifications (Wald $\chi^2 = 2.67$, $\beta = 0.76$, SE = 0.46, p = 0.101, OR = 2.0). As a final check, the MGEE and follow-up binary logistic regressions were re-run using the autoregressive-one specification instead of the exchangeable specification, with similar results found.

In summary, the finding that overcompensatory performance was significantly more likely in the 'no load' condition' but not in the 'higher load' condition suggests the imposition of cognitive load decreased the frequency of overcompensatory timing errors in participants and increased their frequency of paradoxical timing errors to ultimately produce as many overcompensatory performers as neutral performers in the 'higher load' condition. In other words, individual differences in the frequencies of overcompensatory and paradoxical timing errors appeared to be significant and most pronounced in the 'no load' condition. Therefore, 'percentage of paradoxical errors in the 'no load' condition' was selected to be tested as a statistical moderator of the effect of intervention on smoking outcomes.

9.4. TASK THREE: VISUAL SEARCH (VS)

9.4.1. METHOD

9.4.1.1. DESIGN

Participants completed all conditions of a three (instruction type: 'look at centre space only' vs. 'don't look at left space' vs. 'don't look at right space') X two (cognitive load: no load vs. higher load) X three (target letter location on screen: left vs. centre vs.

right) randomised block, within-groups design. The nominal dependent variable was a classification of participants' task performance as paradoxical, overcompensatory, neutral, or inconsistent.

9.4.1.2. MATERIALS AND STIMULI

The task was performed on an Intel Core 2 Duo PC connected to a 38cm Active Matrix LCD colour monitor. Monitor resolution was 1280 X 960 pixels. The experiment was created and run using E-Prime 2.0 Professional Edition software (Schneider et al., 2002). A Cedrus RB-730 Response Pad with a 1ms reaction time resolution was used to record participants' search times. Pre-recorded audio instructions were played through wired headphones.

Each trial consisted of the sequential display of a 'cue' screen, a 'target letter' screen, and a 'test' screen. The cue screen showed three 3.5cm horizontal black lines positioned 10.5cm apart along the equator of the screen to indicate a left, centre and right underlined space on the screen. The target letter screen showed one capital letter, typed in Times New Roman font size 28, in the centre of the screen. The test screen showed one capital letter positioned above each of the previously blank left, centre and right spaces of the screen, one of which was the capital letter displayed on the target letter screen.

To increase the difficulty of discriminating the target letter from filler letters on each test screen, the three letters shown on each test screen were matched according to their likeness in physical appearance. This was done by a group of twelve psychology students who were asked to sort all letters of the alphabet in capital form into groups based on "how

alike they look to each other". They were told to ignore the audible, speech, syntactic, and semantic properties of letters. This group returned four classes of letters: 'fat curved letters' (B, C, D, G, O, Q, U), 'thin stick letters' (I, J, L, T, V, Y), 'fat stick letters' (E, F, H, K, M, N, X, W), and 'letters which could not be assigned to a group' (A, P, R, S, Z). The unassigned letters were discarded and test screens were created using three letters drawn randomly from the same class. The three classes were used equally to create the test screens.

9.4.1.3. PROCEDURE

Participants were seated such as that viewing distance from the screen was approximately 50cm. The experiment was explained to participants as one which would test their speed and accuracy to locate a target letter on screen from among distracter letters. Trial blocks began with audio instructions played through participants' headphones while they viewed the cue screen. When instructions finished playing, the target letter screen displayed for 500ms followed by the test screen for up to a maximum of 5000ms. Participants were told to locate their target letter among the three choices as quickly and as accurately as possible by pressing the '1' key on the Button Box if the target letter appeared in the left space, the '2' key if it appeared in the centre space, or the '3' key if it appeared in the right space. They were instructed to have their index finger, middle finger, and ring finger positioned over these keys respectively in anticipation of the test screen. The test screen displayed until a key response was made up to a maximum of 5000ms. Participants were told that the faster they located their target letter, the more points they would gain. Prior to commencement participants were advised that they would be faster to locate their target letters if they are already looking at a space before their target letter appears at that

space. Fixating their gaze on the space at which the letter then appears would, therefore, allow them to press the correct key faster than if they wait until after the letters appear to initiate their visual search. Participants were told that their primary objective at all times was to fixate their gaze at the centre space prior to the test screen being displayed because correctly and quickly locating target letters at the centre space was always worth the most points on this task.

In addition to this primary objective, participants were told they would receive additional instructions to avoid fixating their gaze at either the left space or right space prior to some blocks of trials. It was emphasised that obeying these avoidance instructions was of secondary importance to their objective of fixating gaze at the centre space and that avoidance instructions were not feedback for performance on previous trials.

Prior to 'look at the centre space only' instruction blocks, participants were instructed: "For this block of trials, look for your target letter at the centre space". Participants were advised that they would gain most points by more quickly locating target letters when they appeared at the centre space and so they would gain more points by fixating their gaze at the centre space before the test screen displayed in anticipation that the their target letter would soon appear there. It was emphasised that target letters would not always appear at the centre space, but that fixating their gaze at the centre space before the test screen displayed would allow them to more quickly locate their letter, and therefore score more points, when their letter did appear at the centre space. Importantly, these instructions specified only where participants *should* fixate their gaze.

Prior to 'don't look at the left space' instruction blocks, participants were instructed: "For this block of trials, look at the centre space and do not look at the left space". It was explained to participants that, on these trials, quickly locating target letters when they

appeared at the centre space was worth the most points but locating target letters when they appeared at the left space was worth the fewest points. Therefore, fixating gaze at the centre space before the test screen displayed and not fixating gaze at the left space would give them a better chance of scoring more points. It was again emphasised that target letters would appear at the left space on some trials, but that target letters appearing at the left space were worth fewest points and so the best strategy on these trials was always to fixate gaze and the centre space and not fixate gaze at the left space before the test screen displayed. The same instructions and explanation were given prior to the 'do not look at the right space' instruction blocks, with the exception that participants were instructed to not fixate their gaze at the right space.

Participants were given the additional task of holding a seven-digit number string in memory on half of trial blocks (higher cognitive load condition). Prior to these trial blocks, a message appeared on-screen; "Please remember the number [seven-digit number]". Participants were told that the program would ask them to type this number in serial order at the completion of the trial block and so they should rehearse this number in their heads throughout the block while also following their audio instructions as best as possible. Participants were told that the program recorded their recall accuracy to give the impression this was important to the investigation.

Participants completed two practice trial blocks under 'look at the centre space only' instruction in the higher cognitive load condition to familiarise themselves with the task. The task commenced once participants indicated they understood their instructions and took approximately eighteen minutes to complete inclusive of a two-minute break after half of trial blocks. Eight trials per instruction block, nine instruction blocks (three x 'look at centre space only', three x 'don't look at left space', three x 'don't look at right space') per

cognitive load condition, and two cognitive load conditions gave 144 trials per participant. Target letters appeared a total of 48 times at each space (twelve times per space per instruction condition) in a random order.

9.4.1.4. Analysis of Individual Differences: Participant Classification Criteria and Procedure

A two-step procedure was employed to quantify the extent of individual differences in paradoxical and overcompensatory processing tendencies on this task. First, participants' visual search times were classified as indicating paradoxical, overcompensatory, or neutral errors as follows. These classifications were based on the well-established principle in visual search/gaze literature that time to locate a stimulus is positively related to the location of eye gaze at the time of stimulus presentation; the faster the search times, the closer we can assume the position of gaze fixation was to the position of the stimulus presentation at the time of presentation; conversely, the slower a search time, the further we can assume the position of gaze fixation was to the position of the stimulus presentation at the time of presentation.

Therefore, when instructed 'not left', a time to locate a target letter at the left space which was less (faster) than that participant's mean time to locate target letters at the left space in the 'look at centre only' (i.e. baseline) instruction condition *minus* 0.5 standard deviations (SD) was classified as a paradoxical error (i.e. faster times to locate letters at the left space when instructed to not look at left space); a time to locate a target letter at the left space which was greater (slower) than that participant's mean time to locate target letters at

the left space in the 'look at centre only' instruction condition *plus* 0.5 standard deviations (SD) was classified as an overcompensatory error (i.e. slower times to locate target letters at the left space when instructed to not look at the left space); and a time to locate target letters at the left space which were equal to or within 0.5 SDs of the mean of that participant's mean time to locate target letters at the left space in the 'look at centre only' instruction condition was classified as a neutral error. The same logic was then used to classify each time to locate target letters at the right space. Frequencies of paradoxical, overcompensatory, and neutral errors made at each of these two screen location were then summed and expressed as percentages for each participant within each avoidance instruction condition.

These percentages were then used to classify each participant into one of four performance groups in each cognitive load condition as follows: first, the most frequent error type (paradoxical, overcompensatory or neutral) in the load condition indicated the participant's initial class; second, the participant remained in this class if he/she made this error type on ≥50% of all timing estimates in the load condition; third, the participant remained in this class if he/she made this error type on ≥40% of all searches in the 'not early' condition *and* ≥40% of all searches in the 'not late' condition within the load condition; and fourth, the participant remained in this class if each of the frequencies of the two less frequent error types each accounted for ≤40% of all searches in the load condition. Failure to satisfy any criterion resulted in classification as an inconsistent performer. Thus, the minimum requirement for classification as, for example, a paradoxical performer, was to have made ≥50% paradoxical errors *and* ≤40% overcompensatory errors *and* ≤40% neutral errors in the load condition.

9.4.1.5. HYPOTHESES AND ANALYSIS PLAN

The same three alternative hypotheses described in section 9.2.1.6. were tested with regard to how avoidance instructions and cognitive load may interact to influence participants' gaze to locate target letters on the computer screen.

9.4.2. RESULTS

9.4.2.1. CHECK OF VISUAL SEARCH ACCURACY

The target letter appeared at each space twelve times in each instruction condition. To check that participants' accuracy in locating target letters did not differ across the three screen locations, a target letter location (3) X cognitive load (2) X instruction type (3) repeated-measures ANOVA was conducted on the number of successful searches. Participants' correctly located 11.66 target letters on average per condition (97.17% accuracy, SD = 1.34). Accuracy did not significantly differ by target letter location, instruction type, or cognitive load (*p*s > 0.514). All interaction effects were also non-significant (*p*s > 0.246). The high accuracy shown by participants in locating target letters across all conditions confirmed the presumption that locating a target letter from an array of three letters would be a very easy task.

9.4.2.2. CLASSIFICATION DIFFERENCES

When applied to search data in the no load condition, the classification procedure yielded 69 (87.34%) neutral performers, six (7.59%) inconsistent performers, three (3.80%) overcompensatory performers, and one (1.27%) paradoxical performer. When applied to search data in the higher load condition, the classification procedures yielded 72 (91.14%) neutral performers, six (7.59%) inconsistent performers, one (1.27%) overcompensatory performer, and zero (0.00%) paradoxical performers. The homogenous clustering of the vast majority of participants into the same, single performance class in each load condition indicated that tests of the effect of cognitive load on classification differences would have proved redundant. Therefore, no further inter-individual analyses were conducted and no variables were selected to be tested as statistical moderators of the effect of intervention on smoking outcomes.

9.5. TASK FOUR: RECOGNITION MEMORY (RM)

9.5.1. METHOD

9.5.1.1. DESIGN

Participants completed all conditions of a three (instruction type: ‘concentrate on centre column only’ vs. ‘don’t concentrate on left column vs. ‘don’t concentrate on right column) X two (cognitive load: no load vs. higher load) X three (‘city name’ location: left column vs. centre column vs. right column) repeated-measures, randomised design. The

nominal dependent variable was a classification of participants' task performance as either paradoxical, overcompensatory, neutral, or inconsistent.

9.5.1.2. MATERIALS AND STIMULI

The task was performed on an Intel Core 2 Duo PC connected to a 38cm Active Matrix LCD colour monitor. Monitor resolution was 1280 X 960 pixels. The experiment was created and run using E-Prime 2.0 Professional Edition software (Schneider et al., 2002) and a Cedrus RB-730 Response Pad with a 1ms reaction time resolution was used to record participants' recognition decisions. Pre-recorded audio instructions were played through wired headphones.

Each trial consisted of the sequential display of a 'cue' screen and a 'test' screen. The cue screen showed a white background against which nine 3.5cm horizontal black lines, positioned 10.5cm apart on the horizontal axis and 3cm apart on the vertical axis, formed a 3 X 3 grid to indicate a left column, centre column and right column on the screen. The test screen showed the name of one African city above each horizontal line, typed in Times New Roman font size 24.

With each city name appearing only once, nine names per test screen and eighteen test screens in total, 162 city names were selected from a Wikipedia webpage[22] titled "List of Cities in Africa" to fill the test screens. A further 148 city names were selected from this webpage to serve as filler names on the recognition tests which followed viewing of test screens. African city names were chosen as the task stimuli as participants would likely be

[22] http://en.wikipedia.org/wiki/List_of_cities_in_Africa

unfamiliar with any of the names used and so could not use any foreknowledge about these stimuli to aid recognition memory. City names not selected to appear in test screens or recognition tests were those with accents, hyphens, apostrophes and other distinguishing punctuation marks; double and triple-barrelled names (e.g. Porto Novo, Sharm-El-Sheikh); names of Capital cities; names shared with a British town or city (e.g. Newcastle); names with five or more syllables; and names with twelve or more letters. The selected city names were arranged into test screens on the conditions that no two city names in a test screen had the same first letter or same first spoken sound, and that city names in the left, centre and right columns were matched on number of letters and syllables, and number of words with an under-hanging typeface letter (i.e. g, j, q, p, or y).

9.5.1.3. PROCEDURE

Participants were seated such as that viewing distance from the screen was approximately 50cm. Participants were told that they would have 15s to memorise the names of as many African cities as possible and then, following a brief delay, indicate as accurately as possible which names on a list they do and do not recognise from the previous screen. It was emphasised, however, that a display time of 15s was typically too short for humans to be able to memorise nine unfamiliar words, and so, more points would be awarded for the correct recognition of names which appeared in the centre column. It was emphasised that the names which appeared in the other two columns may also appear in the subsequent recognition tests, but that correctly recognising these names would always be worth fewer points than names which appeared in the centre column. Therefore, participants were told that while they should always try to memorise as many names as possible, their

primary objective at on this task was to first and foremost concentrate on memorising the more valuable names which appeared in the centre column.

In addition to this primary objective, participants were told they would receive additional information prior to some blocks of trials which did not specify where the participant should concentrate his/her attention, but only specified which column (left or right) contained the least valuable names and so participants 'should not spend too much time memorising names in this column'. It was emphasised that these 'avoidance' instructions were not feedback for performance on previous trials.

Trials began with audio instructions being played through participants' headphones while they viewed the cue screen. Prior to 'concentrate on centre' instruction trials, participants were instructed: "For this trial, concentrate on memorising the names which appear in the centre column". Importantly, these instructions specified only where participants *should* concentrate their attention. Prior to 'not left' instruction trials, participants were instructed: "For this trial, the names which appear in the left column are worth the fewest points on the recognition test which will follow. Do not spend too much time memorising the names which appear in the left column". Importantly, these instructions specified only where participants should not concentrate their attention. The same instructions and explanation were given prior to the 'not right' instruction trials, with the exception of now being instructed to not concentrate on memorising names which appeared in the right column.

When instructions finished playing, the test screen displayed for fifteen seconds before the screen turned black. Following a three-second delay, the recognition test for that trial began with the message, "Do you recognise [name]?" to which the participant responded by pressing either the 'Yes' or 'No' key on the Button Box. Each recognition test

presented in a random order the nine city names displayed on the test screen and nine filler names. Participants were instructed to take their time in making their choice as we were solely interested in their recognition accuracy for names which did and did not appear on the test screen.

Prior to half of trials, participants were given the additional task of holding a seven-digit number string in memory for the duration of the trial (higher cognitive load condition). Prior to these trials, a message appeared on-screen; "Please remember the number [seven-digit number]". Participants were told that the program would ask them to type this number in serial order once the test screen had displayed for fifteen seconds and so they should rehearse this number in their heads while the test screen displayed, while also following their audio instructions as best as possible. Participants were told that the program recorded their recall accuracy to give the impression this was important to the investigation.

Participants completed two practice trial blocks under 'concentrate on the centre column only' instruction in the higher cognitive load condition to familiarise themselves with the task. Testing commenced once participants indicated they understood their instructions and lasted approximately sixteen minutes per participant. Three names per column, three columns per trial, nine trials (three x 'concentrate on centre column only', three x 'don't concentrate on left column', three x 'don't concentrate on right column') per cognitive load condition, and two cognitive load conditions gave participants a possible maximum recognition score of 162 (54 per column). The maximum possible recognition score in each condition was nine.

9.5.1.4. ANALYSIS OF INDIVIDUAL DIFFERENCES: CLASSIFICATION CRITERIA AND PROCEDURE

Each participant was classified into one of four performance groups in each cognitive load condition as follows. A participant was classified as a paradoxical performer if he/she made at least two more correct recognitions for names which appeared in the left column when instructed 'not left' than he/she did for names which appeared in the left column when instructed 'concentrate on centre' *and* when he/she made at least two more correct recognitions for names which appeared in the left column than names which appeared in the right column when instructed 'not left'. This performance was labelled as 'paradoxical' because the instruction to not spend too much time memorising names in the left column led to more correct recognitions of names which appeared in the left column relative to names which appeared in the left column in the 'concentrate on centre' (i.e. control) instruction condition *and* relative to names which appeared in the right column in the 'not left' instruction condition.

An overcompensatory classification was made if a participant made at least two more correct recognitions for names which appeared in the right column when instructed 'not left' than he/she did for names which appeared in the right column when instructed 'concentrate on centre' *and* when he/she made at least two more correct recognitions for names which appeared in the right column than in the left column when instructed 'not left'. This performance was called 'overcompensatory' because the instruction to not spend too much time memorising names which appeared in the left column led to more correct recognitions of names which appeared in the right column (the column opposite that which was to be avoided) relative to names which appeared in the left column in the 'concentrate on centre'

(i.e. control) instruction condition and relative to names which appeared in the left column in the ‘not left’ instruction condition.

A neutral classification was made if a participant made at least two more correct recognitions for names which appeared in the left column when instructed ‘not left’ than he/she did for names which appeared in the left column when instructed ‘concentrate on centre’ *and* at least two more correct recognitions for names which appeared in the right column when instructed ‘not left’ than for names which appeared in the right column when instructed ‘concentrate on centre’ *but* the difference between the number of correct recognitions for names which appeared in the left and right columns when instructed ‘not left’ was less than two.

The same logic was used to classify participants according their recognition scores when instructed ‘not right’, with the exceptions that more correct recognitions of names from the right column and left column now indicated paradoxical and overcompensatory performance, respectively. Participants who did not satisfy criteria for classification as having shown consistent paradoxical, overcompensatory or neutral performance in each condition were classified as having shown ‘inconsistent’ performance.

9.5.1.5. HYPOTHESES

The same three alternative hypotheses described in section 9.2.1.6. were tested with regard to how avoidance instructions and cognitive load may interact to influence participants’ attentional bias when memorising city names on the computer screen.

9.5.2. RESULTS

9.5.2.1. CHECK OF RECOGNITION ACCURACY

To check that participants' accuracy in recognising names did not significantly differ across the three columns, and that participants showed comparable accuracy in recognising test names versus filler names, a target letter location (3) X cognitive load (2) X instruction type (3) X source of name (2: test vs. filler) mixed design ANOVA was conducted on the number of correct recognitions. Participants' correctly recognised 7.16 (79.15%) test names on average per trial and 7.82 (86.89%) filler names on average per trial ($p = 0.702$). Recognition accuracy for test names did not significantly differ by column position ($p = 0.242$). The only significant effect was a main effect of cognitive load ($p < 0.015$), with more correct recognitions made in the no load condition than in the higher load condition. This was expected given that the concurrent digit recall task was intended to interfere with participants' ability to memorise city names. No other significant main or interaction effects were found. Participants' comparably high average rates of accuracy in recognising names from across the three columns of test screens confirmed the presumption that recognising nine, previously unseen African city names as having appeared on a test screen after a 20s viewing period was a relatively straightforward task.

9.5.2.2. CLASSIFICATION DIFFERENCES

When applied to recognition data in the no load condition, the classification procedure yielded 70 (88.61%) neutral performers, seven (8.86%) inconsistent performers, two (2.53%) overcompensatory performers, and zero (0.00%) paradoxical performers. When applied to recognition data in the higher load condition, the classification procedures yielded 71 (89.87%) inconsistent performers, six (7.59%) neutral performers, one (1.27%) overcompensatory performer, and one (1.27%) paradoxical performer. As before, the clustering of the vast majority participants into a single performance class in each load precluded further analysis of inter-individual differences and no variables were selected to be tested as statistical moderators of the effect of intervention on smoking outcomes.

9.6. SUMMARY OF RESULTS OF THE EXPERIMENTAL PHASE

Two dependent variables emerged from the four experimental tasks as good candidates for testing the putative moderating effect of paradoxical tendency on CBSTs' efficacy for smoking abstinence: participants' percentages of paradoxical errors made in the 'no load' conditions of (i) the motor control task (PD-MC), and (ii) motion timing task. These two variables were identified as good candidates for moderator variables because the difference between the proportions of participants classified as overcompensatory performers versus paradoxical performers and (neutral performers were greatest in the 'no load' conditions of these two tasks.

The percentage of paradoxical errors (i.e. a ratio scale dependent variable) made by the participant was selected for moderation testing rather than the classification of the participant itself (i.e. a nominal scale dependent variable) because a nominal variable with

four codes (paradoxical, overcompensatory, neutral, inconsistent) for a sample size of 79 would have critically reduced the power of the planned logistic regression analyses to detect any meaningful moderation effects. Additionally, a logistic regression analysis found that paradoxical movement frequency on the motor control task accurately predicted 100% of paradoxical classifications on this task, while overcompensatory movement frequency accurately predicted 98% of overcompensatory classifications on this task. Similar results were found for the motion timing task. This concordance was wholly expected given that participants' classifications were made on the basis of their percentage of each error type. Therefore, error frequencies were tested as putative as moderator variables in the intervention phase because they provided an extremely reliable index of participants' classification status while considerably increasing statistical power to detect any moderation effects.

Higher frequencies of PD-MC and PD-MT errors were hypothesised to be more strongly associated with abstinence outcomes in the ACT intervention than in the CBST intervention; that is, participants' who more frequently tended to make the errors they had been instructed to avoid on the motor control and motion timing tasks were expected to benefit more from the acceptance-focussed ACT than avoidance-focussed CBST.

CHAPTER TEN: THE SMOKING INTERVENTION PHASE

10.1. ASSIGNMENT AND STRUCTURE

Upon completion of the experimental phase, participants were alternately assigned to either the CBST or ACT intervention and indicated a preferred weekday evening and start time for their first meeting[23]. They were instructed to maintain current smoking patterns until their first meeting and were reminded that use of any pharmacologic aids to cessation during this waiting time would exclude them from participation in the intervention phase. Participants waited 17.88 days on average (SD = 6.29; maximum wait = 25 days) after completing the experimental phase to attend their first group meeting.

Participants were scheduled to attend three, consecutive weekly, 90-minutes meetings, a total contact time of 4.5 hours. Four to eight participants were invited to each meeting, and participant attendance was recorded by the therapist at each meeting. At participants' requests, all meetings started at or after 6pm on weekday evenings. Meetings were held in a private room in the psychology department of the University of Strathclyde, Glasgow. Participants were scheduled to attend meetings seven days apart; however, due to work schedules and travel constraints, some participants occasionally attended meetings six to eight days apart.

10.2. DELIVERY

Both interventions were led by the same therapist, an advanced doctoral psychology student with two years of experience in delivering smoking-focused CBST and ACT to groups of motivated-to-quit smokers. The study therapist met weekly with the study

[23] This procedure was designated as random because participants had an equal chance of being assigned to either intervention (Litt et al., 2003).

supervisor, Professor John Davies, to review the previous week's meetings, discuss the upcoming week's meetings, and discuss any issues regarding the delivery and receipt of taught concepts and skills at meetings. Additional supervision and consultation was provided upon request throughout the study period.

10.3. Development of Therapy Manuals

Both interventions were delivered in accordance with manuals developed specifically for use in this study. The content and procedures specified for delivery at each meeting were drawn and adapted from core theoretical texts and therapist training manuals relevant to each intervention model and, in consultation with the research supervisor, content was iteratively amended, supplanted, or omitted. The final manuals incorporated a rationale for each taught concept and skill, didactic teaching, group problem solving and discussion, in-meeting exercises and skills practice, and homework assignments.

10.4. Non-Specific Intervention Components

Both interventions followed the same pattern and shared several non-specific components. The first meeting in both interventions began with participants informally introducing themselves to the group, after which the therapist conducted a brief functional assessment of participants' smoking histories (e.g. why participants have sought help to quit smoking, what they want to get out of these meetings, and how they think they will get it). The

first meeting concluded with the therapist and participants agreeing to a therapeutic contract which specified the ground rules for treatment. Establishing rules regarding attendance, data provision, confidentiality, and homework assignments gave participants clear expectations from the outset about how the intervention and data collection phases would proceed and what may be expected from them at each stage.

The second and third meetings began with a review of events since the last meeting, assessment of participants' attempts to do the homework assignment, a review of previously taught skills and concepts, and an introduction to new skills and concepts. These meetings concluded with the assignment of homework exercises, which involved self-monitoring for problem thoughts and behaviours and being vigilant for opportunities to enact the learned skills in daily life. The therapist emphasised that completing the homework assignments was essential if participants were to fully benefit from treatment. The quit date for all participants' was set for the date of their third meeting.

The delivery of intervention-specific components and skills followed the same pattern in each intervention. Each new skill was introduced by providing a rationale for it in terms how the skill relates to quitting smoking and its potential usefulness in light of past difficulties with quitting smoking. The therapist gave step-by-step instruction as to how each skill should be implemented and gave examples of real-world scenarios in which each skill might usefully be applied. The therapist modelled the enactment of selected skills and, when appropriate, invited participants to rehearse skill enactment in role-play scenarios. Lastly, graduated exposure to smoking stimuli, both within and out-with meetings, and periods of abstinence from smoking out-with meetings were scheduled to gradually develop participants' confidence and ability to enact taught skills beyond the formal treatment period.

Throughout the course of all meetings, the therapist regularly probed for participants' understanding of key concepts and skills, monitored for flagging motivation, and bolstered quitting motivation to by revisiting participants' reasons for wanting to quit, communicating confidence in their abilities to quit at this attempt, praising attempts to complete homework assignment no matter how minimally or poorly completed, and reaffirming his own commitment to provide training and support for them to quit smoking at this attempt.

10.5. THE CBST INTERVENTION

Material for the CBST intervention was adapted from a comprehensive therapist training manual for delivering CBST for alcohol dependence (Monti et al., 1989) – which was subsequently adapted and delivered as part of Project MATCH (Project MATCH Research Group, 1997), a multisite clinical trial of patient-treatment matching for alcoholics – and an established standard intensive behavioural smoking cessation protocol (Brown, 2003) which has yielded positive smoking outcomes in several controlled trials, including high-risk populations of smokers with past major depressive disorder (Brown, Kahler, Niaura, Abrams et al., 2001). Both sources were published to allow therapists to apply these efficacious CBST protocols to other clinical populations. The delivery order of CBST components in the current intervention was based source recommendations.

Based in social cognitive theory, the core thesis of CBST is that the critical component of the behaviour change process is the ability to respond to conditioned smoking stimuli in more adaptive ways. Thus, the overarching goal of the CBST intervention was to build participants' repertoires of adaptive avoidance and coping strategies which meet needs

formally met by smoking. To this goal, six core CBST intervention components(see table 2), were used to create an interpersonal context which rationalised, modelled, supported, and reinforced the use of avoidance coping skills in situations which posed a high risk for smoking.

TABLE 2. OVERVIEW OF CBST AND ACT COMPONENTS AND TECHNIQUES.

Meeting	Intervention	Components	Techniques
1	CBST	• Build rapport • Introduce rationale for CBST	• Explain social cognitive theory of relapse • Identify internal and external smoking triggers
2	CBST	• Trigger-specific coping skills training • Communication skills training	• Identify high risk situations • Develop strategies to avoid high risk situations a. Change daily routines b. Remove opportunities to smoke c. Request behaviour change from others d. Reward success • Develop strategies to cope in high risk situations • Keep hands and mouth busy • Engage in distracting activities
3	CBST	• Relapse prevention skills training • Mood management skills training	• Awareness of dangerous thoughts and negative moods • Positive steps to increasing pleasurable activities • Obstacles to increasing pleasurable activities • Decreasing unpleasant activities • Cigarette refusal skills • Responding to a slip/lapse • Responding to flagging motivation • Review all CBST techniques
1	ACT	• Draw out 'the system' • Weaken rationale for avoidance of private and external events linked to smoking • Introduce 'willingness to experience' as a functional	• Clarify valued life goals • Explore what has been tried to quit smoking • Examine the workability of previous strategies • Discuss avoidance as the problem, not the solution • Engender a sense of creative hopelessness • Introduce concept of being willing

		alternative to avoidance responding	• Practice willingness and mindfulness skills within smoking experiential exercises
2	ACT	• Weaken social-verbal contexts which support cognitive fusion • Break link between private experiences and smoking behaviour	• Defuse literal meanings of verbal labels from the experiences to which they refer • Create distance between the thinker and the thought • Attack troublesome social-verbal conventions
3	ACT	• Build patterns of committed action linked to valued life goals	• Explain link between committed action, willingness and defusion • Identify goals and construct action plans linked to quitting smoking • Maintain committed action in event of a relapse to smoking and/or avoidance and fusion tendencies.
1	CBST/ACT	• Non-specific therapy components	• Introduce group members • Conduct functional assessments of smoking histories • Bolster motivation to quit • Communicate care, concern and confidence • Foster intra-group peer support for quitting • Establish therapeutic contract and ground rules • Assign homework
2	CBST/ACT	• Non-specific therapy components	• Assign homework
2 & 3	CBST/ACT	• Non-specific therapy components	• Review homework and events since last meeting attempts to complete homework • Probe for understanding of key skills and concepts • Communicate confidence in participants' abilities to use new skills effectively. • Bolster motivation to quit • Reinforce intra-group support for quitting

10.5.1. CBST – MEETING ONE

The aims of the first CBST meeting were to begin building a rapport between the therapist and participants, explain to participants the structure and goals of the meetings, and introduce the rationale for the CBST approach. Functional assessments of participants' smoking histories were conducted, which involved examination of current reasons for smoking and how these have changed over time, strategies they have used to try to quit in the past, past quitting successes, daily smoking habits/routines, reasons for wanting to quit now, and self-efficacy beliefs for quitting at this attempt.

The social cognitive learning theory of smoking relapse was explained to participants in simple language, using participants' self-reported smoking motivations as examples of how smoking can change the way a person thinks and feels and how these changes can make it difficult to control smoking. Participants were told that "some people smoke to increase pleasant feelings when they are feeling bad (e.g. sad, nervous, stressed) while others smoke to maintain a level of comfort when they are feeling good (e.g. happy, relaxed), and that these mood changes can be so powerful that people quickly come to favour smoking as their way of coping in a variety of pleasant and unpleasant situations. Unfortunately, as a result of relying on smoking to cope with life for many years, people gradually lose the skills and confidence to cope in these situations without smoking". The purpose of this therapy approach, participants were told, was to identify the internal states (thoughts, feelings, bodily sensations) that increase their urge to smoke, and the external events (people, places, objects) which trigger these internal states, with the goal of developing a range of alternative, adaptive cognitive and behavioural coping strategies that can be effectively used in these situations instead of smoking.

The distinction between internal and external smoking triggers was clarified using frequently reported exemplars. Participants were told that triggers are different for everyone and are not always immediately obvious. Therefore, in order to decide the appropriate skills to learn and how best to learn them, participants were instructed not to change their smoking behaviour in the first week, but only to record in a self-monitoring record the internal states and external and internal events which preceded and followed each smoking episode. Instruction was given for completing this record.

10.5.2. CBST – MEETING TWO

Based on participants' self-monitoring records for the past week, the second meeting was spent improving their existing behavioural responses to triggers, planning to alter and substitute the behaviours which typically lead to smoking, and planning and committing to new cognitive and behavioural responses to smoking triggers. The therapist outlined two sets of strategies which would be learned: strategies which help a person to avoid his triggers before they are encountered and strategies which help a person to cope with triggers as they are being experienced.

First, it was emphasised that the best way to deal with cravings and urges to smoke was to avoid the things which trigger an urge to smoke in the first place. The therapist and participants discussed how and when exemplar and participant-generated strategies might be implemented to avoid exposure to people, places and things which have in the past led them to smoke. Avoidance skills training focused on changing or breaking up participants' daily routines (e.g. "if your normal route home from work is strewn with triggers, consider whether

it might be possible to take a different route home for a while"; "if you tend to have a cigarette with a cup of coffee in the morning, try switching to fruit juice or a low sugar soft drink for a while"), eliminating their opportunities to smoke (e.g. cutting up or binning cigarettes, carrying around only enough money for essential purchases), and ways to request behaviour change from others (e.g. asking work colleagues to not invite one out for smoking breaks or make one feel guilty for declining these invitations).

The therapist then emphasised that because it is not always possible or practical to avoid one's triggers, it was necessary for participants to learn a range of coping behaviours which can be done instead of smoking in high risk situations. Coping skills training focused on keeping one's hands and mouth busy (e.g. nibbling carrot sticks, squeezing a stress ball) and engaging in distracting activities (e.g. phoning a friend). The therapist regularly probed for participants' understanding of the distinction between an avoidance strategy as something which can be done before a trigger is encountered, and a coping strategy as something which can be done in the presence of a trigger. A significant portion of the meeting was dedicated to generating a range of avoidance and coping skills which would be practical and effective for participants' to deal with a variety of likely and possible events in their daily lives. As each new skill was introduced, the therapist and participants discussed where, when and how the skill may be used and what the possible outcomes might be.

The homework assignment required participants to schedule short periods (1-2 hours) of total abstinence from smoking (i.e. not even a puff) on each of the following seven days to gain practice in applying their newly learned coping skills in situations that are strongly associated with their smoking. Participants were encouraged to view scheduled abstinence periods as 'practice quit attempts' in preparation for their quit day the following week, and so they should use these windows to practice their trigger awareness and using the

alternative responses learned in-session. They were instructed to keep a daily record of situations in which they experienced an urge to smoke, the intensity of their urge, the coping strategy used, and the outcome of using this strategy.

10.5.3. CBST – Meeting Three

The third CBST meeting focussed on raising participants' awareness of the situations which may arise when they have stopped smoking for a while, the thoughts and moods which may rationalise a return to smoking, and the strategies that can be used to prevent a relapse in these situations. The therapist discussed the role played by negative thoughts and moods in rationalising a return to smoking and the importance of keeping vigilant for situations which may lead a person to have thoughts about resuming smoking, such as desires to escape discomfort, unwind, appear sociable, and increase self-esteem, and feelings that one has no control over smoking. For example, the therapist discussed a number of ways in which participants could alleviate common trigger emotions, such as stress and worry, indirectly by increasing their involvement in pleasurable activities and directly by decreasing their involvement in activities which occasion stress. Positive action strategies included increasing one's levels of physical activity, constructing and sticking to a daily schedule of activities which bring pleasure, and identifying likely obstacles to one taking positive actions. Strategies for decreasing involvement with unpleasant activities included learning which affective situations can be practically avoided or modified to be more manageable or less aversive, planning how one will respond to possible unpleasant events such as arguments or pressure, learning to say no to things which one does not want or need

to do, moving towards unpleasant activities which one feels can be mastered, and limiting the amount of time one spends on unpleasant activities.

When behavioural avoidance was neither possible nor practical, learning how to resist direct (being offered a cigarette) and indirect (being in surroundings that are associated with smoking) pressures to smoke was taught as the next best response. Explaining to friends in a calm, polite way that one is trying to quit smoking and that one would greatly appreciate their support and assistance, which includes not offering any more cigarettes, not teasing one about quitting, not mocking one for any slips, and not making one feel guilty for not accepting invitations to smoke were all taught as efficient ways to prevent direct social peer pressure to smoke from reaching such a level that the participant feels compelled to smoke.

In the final segment, the therapist introduced strategies which aim to prevent a single smoking lapse, or slip, should one occur, from turning into a full-blown relapse. It was emphasised that occasional smoking lapses were common amongst quitting smokers and that any one slip does not spell the end of a quit attempt, nor does it mean that one is helpless or hopeless. Instead, relapse and remission were conceptualised for participants as processes of change, or 'normal rehearsals for success' rather than an end-states. Preventing or limiting the frequency of slips and relapses by learning from the events which preceded each slip was set as a more realistic goal for participants. To this goal, participants were encouraged to empirically analyse the events which surrounded each slip, should they occur. This analysis involved examining what one was thinking and feeling immediately prior to the slip, examining what might have caused these thoughts and feelings, asking one's self which settings (people, places, objects) may need to be avoided in order to avoid these causal thoughts and feelings, discuss with another person the events which led up to the slip and

how these events were responded to, anticipate future exposure to trigger settings and plan and commit to a more adaptive coping response, and finally, view the slip as a learning experience, an opportunity to find out what went wrong, what could have been done better, and what can be changed for the future. The therapist concluded the meeting by re-emphasising his confidence in participants' abilities to quit smoking at this attempt, the importance of being mindful of when one's motivation to stay with the quit plan is flagging, and the importance of practicing all taught cognitive and behavioural coping strategies to the point that they are implemented fairly reflexively in high-risk situations.

10.6. THE ACT INTERVENTION

Material for the ACT intervention was adapted and developed from a comprehensive ACT protocol developed by the co-creators of ACT (Hayes et al., 1999), a comprehensive ACT skills training manual for therapists (Luoma et al., 2007), and a smoking-focused ACT protocol which has yielded superior long-term quit rates than the transdermal nicotine patch in a randomised, controlled design (Gifford et al., 2004). The order in which ACT components were delivered was based on source recommendations.

The core thesis of ACT, as it applies to smoking cessation, states that the critical component of the behaviour change process is the ability to respond with psychological acceptance and values-consistent behaviour in the presence of stimuli which have been conditioned to cue smoking (Gifford et al., 2004). The overarching goals of the ACT intervention, therefore, were to reduce participants' negatively reinforced avoidance of difficult private and external events, foster willingness to experience difficult events as a

method to increase values-based action, defuse thoughts which rationalise avoidance behaviour, and foster commitment to valued action in the presence of smoking stimuli. These goals were targeted through seven of ACT's defining therapeutic elements – drawing out the system; examining workability, avoidance as part of the problem; creative hopelessness; willingness to experience; cognitive defusion; and values-linked committed action (see table 2).

10.6.1. ACT – Meeting One

ACT formally began with the therapist attempting to draw out the system within which participants had tried to quit smoking up until this point. Participants were guided to identify their broad valued life direction through key questions: "What do you really want from life? Who do you want to be? What do you want to get out of coming here? What is currently stopping you from living the life you value? What has to change before you can live the life you want?" An inability to quit smoking was unanimously cited as the most significant obstacle keeping participants from living the life they value, and possible barriers to quitting smoking were explored by assessing the functions which smoking has served and currently serves for participants. As expected, desires to increase pleasant feelings and decrease unpleasant feelings were cited as the predominant reasons for continuing to smoke. Clarifying participants' valued life goals, the ways in which smoking interferes with their pursuit of a valued life, and how not smoking has many positive impacts is known to motivate participants to engage with treatment and so these discussions were revisited throughout all meetings as appropriate.

The values assessment phase drew out a mix of participants' outcome goals (what they want) and process goals (how they believe they will get it), and in turn, the link formed between the two that has trapped participants in a cycle of attempting to quit and failing to quit. For example, most participants' indicated a belief that they will be able to quit smoking (outcome goal) when they are able to get rid of the bad thoughts and feelings which tend to accompany nicotine withdrawal (process goal). This derived causal link between private events and overt behaviour suggested that participants' behaviour is currently being heavily influenced by the evaluative and symbolic functions of private experiences, which may have supported past quit efforts that were essentially efforts to change the frequency or form of private experiences that had been evaluated negatively because of their relation to smoking.

Beginning with the assumption that what participants have done up till this point to try to quit smoking has itself been part of the reason why they are still smoking, the next therapeutic goal was to clarify what has not worked. Participants were asked to list everything that they have done in an effort to quit smoking up till this point, being thorough, specific and recalling every strategy no matter how infrequently used or seemingly insignificant, and what the outcomes of these were. These lists revealed that most past attempts to quit smoking were essentially efforts to control and avoid withdrawal- and situation-induced negative affect which had proved either ineffective, effective only in the short term, or effective in the long term only when the participant reduced his/her exposure to other valued activities, situations, and/or relationships.

The therapist explained to participants that many people who seek assistance to stop smoking arrive for therapy with the belief that their smoking is being caused by certain 'bad' thoughts and feelings and so it seems sensible that they should try to avoid and control these experiences. However, in discussing what has been tried and failed, the therapist drew

participants' attention to the conflict between what 'the mind' was telling them about what should work and what experience was telling them about what actually works. The therapist suggested that on one hand, it seemed perfectly normal, logical and understandable that avoiding the physical and emotional distress which typically accompanies smoking cessation is 'the right thing to do', but on the other hand there is undeniable evidence that the problem remains today. The therapist suggested that the 'mind' appeared to be leading participants' down 'dead ends', promising one thing and delivering another, but that they appeared to be repeatedly willing to give the 'mind' another chance to be right, as if past experiences were somehow invalid. The therapist used the *Chinese Handcuffs* metaphor (Hayes et al., 1999: 105) to illustrate an instance of the fundamental unworkability of seemingly sensible behaviour to solve a problem, and in which the solution was counter-intuitive. The therapist asked participants to consider that perhaps their difficulty with quitting smoking was like the difficulty of escaping the Chinese handcuffs; perhaps they need to take a different, even counter-intuitive approach, to quitting smoking from what their minds have been telling them to do. This drew the discussion back to participants' valued goals, in particular, whether it was more important for participants' to 'be right' about what strategies are needed to quit smoking or whether it was more important to find strategies that were workable in their lives.

The second therapeutic goal was to begin to weaken the rationale for avoidance coping with unpleasant private stimuli as an effective method of quitting smoking. Participants were asked to imagine what might happen if they continue to use the same seemingly logical and reasonable strategies which have ultimately not worked in the past. The therapist constructed hypothetical scenarios in which participants may be tempted to smoke, and asked: "What does your mind tell you to do in this situation? Has this worked in

the past? What does your experience tell you about what might happen if you try the same thing again? If you follow what your mind says this time, will you get the outcome that your mind promises?" Most participants claimed that they have tried everything that seems logical to try but that nothing had worked for longer than a few days, and that repeating these strategies would, for unknown reasons, likely yield a similarly negative outcome. The therapist added to this experiential feedback by asking participants to consider that their experiences may be valid, that their belief that troublesome thoughts and emotions need to be controlled is incorrect; perhaps it is not simply the case that these strategies have not worked; perhaps they *cannot* work.

The *Person in the Hole* metaphor was used to illustrate an instance in which an individual puts a lot of effort into solving a problem only for his problem to worsen. Participants' were asked to consider that they too have been stuck in a hole of sorts for some time, that they have tried every logical thing they can think to get out of this 'hole', and that they have used all the 'tools' at their disposal to dig themselves out but now find themselves in deeper than before. Logic tells the man in the hole that digging should eventually be the solution, while at the same time his experience tells him that digging is keeping him in the hole. Participants were asked to consider that a useful first step for both the man in hole and themselves would be to acknowledge that what they have been doing hasn't worked and to 'drop the shovel', even if they don't know what to do next. This metaphor captures the essence of participants' difficulties with quitting smoking in several ways, such as suggesting that their failure to quit up till now appears due to an attachment to unworkable strategies, not to a lack of effort, that the seemingly logical solution – 'continuing to dig' – is not the answer, and that quitting smoking may require their willingness to take counter-intuitive action. The therapist probed for participants' detection of these lessons and other

interpretations of this metaphor. The therapist clarified that viewing their situation as hopeless did not mean that any participant was hopeless; it means that what he/she has been doing is hopeless, but that he/she can change what he/she does. The therapist clarified that for participants to view their situation as hopeless is not a bad thing; instead, if participants are willing to give up on strategies when giving up is called for in service of valued goals, then they should view the discovery of this hopeless situation as a place from which they could begin to try something different, as an opportunity to abandon their unworkable agenda and allow new solutions to emerge. The *Quicksand* metaphor was also used to reinforce the priority of workability over logic when solving a problem.

This next phase of the meeting began with the therapist explicitly introducing the idea which had been emerging up to this point: trying to control the unpleasant thoughts and emotions which accompany abstinence from smoking may make the abstinence experience more, not less, difficult to tolerate. The therapist aimed to reduce participants' confidence in the effectiveness of control-based quitting strategies by explaining five reasons, based in verbal relational learning, for why experiential control is difficult, and at times, seemingly futile as a method of quitting smoking: (1) the verbal plan to avoid specific smoking thoughts and emotions necessarily containing the thoughts and emotions that are to be avoided; (2) distraction from smoking thoughts only works for as long as we don't check that it is working; (3) the verbal labels which we attach to these troublesome experiences become inextricably verbally linked to a range of other stimuli, and their positive and negative functions, that are ubiquitous in daily life; and (4) successful avoidance of smoking stimuli tends to come at the cost of withdrawing from other valued activities, environments, and relationships. The *Polygraph* metaphor (Hayes et al., 1999: 123) was also used to illustrate how persistent attempts to control a perfectly natural emotional reaction can

paradoxically amplify the very emotional reaction that was to be controlled, and participants were asked to describe their own experiences of times when trying to control a particular unwanted thought or emotion actually led them to have more of this thought or feeling, and in turn, made smoking more difficult to resist.

The third therapeutic goal was to foster participants' willingness to experience previously-avoided smoking stimuli through exposure exercises as a functional alternative to avoidance. This phase began with the therapist opening participants up to the possibility that they do not need to get rid of difficult private experiences in order to quit smoking and, more broadly speaking, to live a life they value. The idea was introduced that if distressing smoking thoughts and feelings grow out of our attempts to stop them, then relinquishing control of the private experiences which motivate smoking and instead being willing to fully experience the distress which inevitably accompanies quitting smoking may actually reduce the aversive properties of negative private events and, in turn, increase their willingness and ability to persist with abstinence while experiencing these events. Participants were invited to discuss the merit of this idea.

Being 'willing to experience' was defined as "embracing, holding, and compassionately accepting their thoughts and feelings completely, for what they are in the moment, fully and without defence"; the therapist spent some time explaining what was meant by each of the key terms in this definition (e.g. embracing, in the moment, fully and without defence). 'Willingness' was presented as a behavioural choice that participants could make in the presence of internal states and external events that enhance their urge to smoke. Examples of overt acceptant behaviour included continuing to engage with people, places and activities which are valued even if they enhance craving to smoke. The therapist

and client discussed what it might feel like for them to be willing to experience all the thoughts, feelings, and physical sensations that have tended to avoid.

The Harvey Milk Story was then used to help participants imagine what it looks like to be willing in a difficult circumstance. This story gives a factual example of a person who anticipated the unworkability of efforts to avoid thinking about a distressing letter he had received, and that he could embrace the existence of this letter, and the views which it contained, while continuing to live a life that really mattered to him. *The Harvey Milk Story* suggests that trying to not think about smoking during abstinence from smoking is extremely difficult because our environment is littered with reminders of smoking, and that would be impractical and life-limiting to withdraw from these environments. Instead, the therapist explained that letting go of their struggle to control their thoughts about smoking and beginning to embrace these experiences as an inevitable part of a significant, valued life change, though initially difficult, should gradually reduce the negative impact of these private events and in turn increase individuals' willingness to sit with these private events without feeling the need to smoke to alleviate them. The *Joe The Bum* metaphor (Hayes et al., 1999: 240) was then described to give participants an opportunity to imagine what it might feel like to be willing to experience an uncomfortable situation in service of a longer-term, valued goal. Participants were encouraged to discuss how they might react at each stage of the metaphor and the workability of each reaction in terms of their valued goal.

For the remainder of the meeting, two experiential exercises – *Urge Surfing* and *Leaves on a Stream* – were used to enhance participants' awareness of their changing private experience and external environment, and to provide a safe context in which they could practice non-judgemental, non-evaluative mindfulness of personally-relevant smoking thoughts which have been historically feared and avoided. The goal of these exercises was

for participants to choose to allow themselves to experience whatever it was that they were experiencing at that moment; to be willing to feel every experience gently, even if the experience is undesirable, in order to increase their cognitive and behavioural flexibility when exposed to smoking stimuli in daily life. The therapist re-iterated to participants that willingness can be tricky and will require time and practice simply because willingness is the opposite of what they have been showing for such a long time. The meeting concluded with the assignment of the homework task for the next seven days; to become more aware of all the things they normally do to try to quit smoking and when they are doing them, to become more aware of their smoking-related thoughts, emotions and physical sensations as they are occurring, and to notice what it feels like to sit these experiences without struggling to control their form or flow. Participants were not explicitly told to change their smoking behaviours, only to practice sitting mindfully with any smoking stimuli which arose, and record their observations and experiences of this task in a self-monitoring sheet. A 15-minute audio track, which narrated instructions on how to enhance mindfulness skills when a smoking urge is occurring, was also provided to aid this task.

10.6.2. ACT – Meeting Two

The goal of the cognitive defusion component was to detect and weaken the social-verbal contexts which have up till this point reinforced the belief, ubiquitous among quitting smokers, that smoking is directly caused by the presence of certain thoughts, feelings, and situational events, a belief which limits their willingness to persist with abstinence while these events are occurring. Participants were led through a number of defusion metaphors and exercises which aimed to defuse the verbal content of smoking-related cognition from

its literal, symbolic functions, create distance between the thinker and his/her thoughts, and attack, as appropriate, participants' use of social-verbal conventions which support cognitive fusion. Each exercise was designed to break the perceived causal link between private experiences and smoking behaviour, and in turn reduce the functional importance of avoiding certain thoughts, feelings and situations. Throughout the meeting participants were probed for learning of two core defusion skills: the ability to defuse the literal meanings of key words (e.g. anxious, stress, worry, craving, need, can't, trigger) from the experiences (thoughts, feelings, situational events) to which they refer; and, the ability to defuse one's private experiences from a core sense of an experiencing self, that is, to appreciate that experiences are something which one *has*, not something one *is*. Both skills expand the functions of previously avoided private events beyond their literal, evaluative functions and so allow participants to respond with greater flexibility when exposed to private events that had previously provided compelling reasons to smoke.

The Milk Exercise (Hayes et al., 1999: 154-155) was introduced as a playful way to demonstrate that a context is needed for words to have a shared and a private literal meaning, and that when the context of a word is removed or changed, the meaning of the word is changed. Participants were asked what came to mind when they heard the word 'milk'. They typically reported the symbolic functions of this word (i.e. the substance to which this word refers and its close symbolic verbal relations, e.g. cow, white, glass, drink). They then repeated the word 'milk' rapidly and aloud for 30 seconds, after which they were asked what came to mind when they now thought of the word 'milk'. Now, participants tended to report that the word sounded more like a funny string of sounds than a thought, and what came immediately to mind was the way their mouth and tongue felt when trying to produce the word. This was in line with the desired defused effect; through its rapid

repetition, a word gradually loses its derived symbolic properties and its direct experiential stimulus functions (i.e. what it physically feels like to produce the sounds which make up the word) come to the fore, perhaps for the first time in a long time.

Using this technique, participants then tried to defuse the literal meanings from personally-relevant troublesome smoking thoughts and shared the outcomes with the group. The therapist probed for their understanding of the core message of this technique: thoughts and feelings don't have to mean what they say they mean, and it is not difficult to establish verbal contexts in which the derived symbolic functions of a word (e.g. an enhanced urge to smoke is a derived function of the word 'stress') quickly weaken and almost disappear. *The Milk Exercise* demonstrated that simply having thoughts about smoking does not in itself cause one to smoke, but how one looks at thoughts can make them appear like good causes. In turn, smoking thoughts come to look less like causes of smoking behaviour when we view them from a different perspective.

As an further example of this lesson, participants were asked to imagine how differently they might feel about smoking if cigarettes were renamed as something extremely positive like 'fluffy shiny happy fun sticks' versus something extremely negative like 'dark violent pain death misery sticks'. This example nicely illustrates that people tend to respond, emotionally and behaviourally, to the symbolic functions of verbal labels rather than directly to the experience to which the verbal labels have been attached. However, by changing the context in which positively and negatively evaluated words are experienced, not the frequency with which these thoughts occur, participants should be able to experience their thoughts as merely bits of language free of (i.e. defused from) their harmful symbolic functions. Participants were probed for their understanding of these core messages.

Participants were then led through *The White Bear Game*, an imagery exercise which involved creating a fantastical, humorous context in which participants could view their thoughts as if they are physical objects, as a method for demonstrating the contextual regulation of the impact of verbal cognition on behaviour. Sat with eyes closed, participants imagined sitting opposite a large white polar bear on an ice shelf floating in the ocean. Participants were first asked to hold on to the first thought that came to mind; the bear would then read the participant's mind, write down the participant's thought on a wooden sign, and reveal this sign to the participant who would reward the bear with a a fish. The participant then repeated this procedure but this time holding in mind thoughts about one's smoking triggers. After several repetitions of the bear correctly guessing the participants' smoking thoughts, the therapist and participants discussed what was noticed while engaging with this fantastical situation. Participants tended to report that they were able to sit quite comfortably with the very thoughts they have long tried to avoid but without experiencing the distress which had motivated them to avoid these thoughts in the first place. Instead, these thoughts were experienced as merely words in a funny situation. The therapist pointed out that their willingness to engage with their most feared smoking thoughts in this game demonstrated that there is nothing inherently distressing about any thought, but that thoughts can function to distress participants under certain conditions, none of which were present in *The White Bear Game*. Instead, when contacted within a light-hearted, ridiculous situation in which no functional relations had previously been established between a thought and the act of smoking, participants found that their smoking thoughts were, in and of themselves, harmless and actually quite tolerable. The therapist used this discovery to re-iterate the message that people tend to avoid certain thoughts and feelings, not because they are themselves unpleasant, but because they feared the consequences (i.e. the functional relations) of allowing these thoughts to remain in mind; change the context to one in which

no negative consequences have yet been established, however, and one can quite easily experience derive new, pleasant functional relations involving once feared thoughts.

Three other defusion exercises were used as appropriate to attack participants' use of social-verbal conventions which were supporting them to fuse with their thoughts and other private experiences. These exercises functioned primarily as methods for restoring a sense of healthy distance between the participant and the content of his/her thoughts. First, the therapist was vigilant for suggestions that participants were evaluating their thoughts as 'good' or 'bad' and had fused with the literal truth of these evaluations (i.e. their sense of self was indistinct from their thoughts). The *Calling a Spade a Spade* technique (Hayes et al., 1999: 169-170), which involved breaking up participants' streams of negative evaluative self-talk into the *kind* of talk participants were engaging in (e.g. descriptions, evaluations, attitudes, opinions, beliefs), was introduced in response to participants' claims that they literally *are* their thoughts, e.g. "I *am* anxious", "I *am* stressed", and "I need to smoke" as opposed to "I am a person who is having the evaluation that I am anxious", which is actually what has occurred. The therapist responded to these instances of fusion by asking the participant to buy into his/her "I am …." thought for a few seconds and notice how they feel. Then, they were asked to put the words "I notice that I am having the thought that I am…" in front of the thought and see what happens. The addition of "I notice that..." draws the participant's attention to the distinction between process of thinking as something which the client is doing and the content of thought as something which is had, which helps the client to see that he is the person doing the thinking, not the thought he is having.

The *Contents on Cards* exercise (Hayes et al., 1999: 162), which involved participants treating their thoughts as if they were physical objects, was also introduced as a method for separating the self from thoughts. Objectifying thoughts in this way gave

participants the opportunity to first, take the perspective of an observer who is looking at something which is separate from him/herself, as opposed to looking at the world from his/her thoughts; second, to see that he/she is in control of how his/her thoughts behave, not the other way around; and third, see he/she can engage with difficult smoking thoughts while showing constructive, valued behaviour.

Lastly, the therapist asked participants to notice when they were using the words 'but' and 'because' as part of their explanations for why they relapsed to smoking in the past, and to notice what happens when they substitute 'and' for these words. 'But' means that what came before and what comes after cannot both be true. For example, "I want to stop smoking but I'm stressed at the moment" implies that one cannot stop smoking for as long as stress levels are high; "I want to quit smoking and I'm stressed at the moment" makes it possible for both statements to true and reduces the believability of stress as a literal cause of a relapse to smoking. Similarly, "I smoke because I'm stressed" changed to "I smoke and I'm stressed" implies that stress and smoking are independent events and therefore suggests the participant should be able to take valued action while feeling stress.

The therapist concluded the meeting by stressing that certain thoughts should be targeted for defusion not because they are in themselves 'bad' thoughts but because the way in which the participant has been *relating* to this thought has prevented him/her from taking valued action (i.e. quitting). Each defusion exercise demonstrated in its own way that thoughts don't need to mean what they say they mean, but rather, we derive their meanings from the context in which they are used. Therefore, creating workable contexts in which thoughts are defused from their literal, evaluative 'triggering' functions should increase participants' tolerance of these thoughts and their verbal-linked discomfort, and in turn, increase their willingness to persist with smoking abstinence while these thoughts are

occurring. In other words, defusion was conveyed as a means to a valued end. As homework, participants were given a list of brief defusion techniques to apply to the smoking thoughts and feelings which have most struggled with in the past. The therapist emphasised that the purpose of these exercises was not to reduce contact with troublesome thoughts, but rather to remain present with these thoughts while viewing them from a different perspective.

10.6.3. ACT – Meeting Three

The final ACT meeting focussed on building patterns of committed action linked to participants' valued life goals which smoking was currently interfering with. The goals of this component were to help participants link valued goals to workable action plans, prepare them for new experiential barriers which may arise as a result of engaging in committed action, and maintaining committed action in the event of a smoking relapse and a relapse to old, unworkable patterns of verbal and nonverbal behaviour.

First, the term 'committed action' was explained to participants as being willing to persist with or change behaviour, whichever is called for to live in line with one's values, and an appreciation that one is able to link action to values in any situation. Showing committed action requires one to assess what actions are afforded by each situation and which of the afforded actions would best serve their values. The therapist described the intertwining relationship between committed action and the two core skills covered in previous meetings: willingness to experience difficult private experiences, and cognitive defusion. It was explained that committed action depends 100% on willingness and defusion

because a person who fuses with the literal content of his/her thoughts and therefore commits to not experiencing any difficult smoking-related thoughts, feelings or sensations will be unable to commit to and keep on a course of valued action – such as quitting smoking – because doing so would inevitably evoke these difficult experiences. However, when a person is willing to experience these difficulties, he/she becomes able to take steps towards a valued goal, and so commitment makes sense of the leap of faith to show willingness. And vice versa, engaging in committed action should bring to the fore the cognitive and emotional barriers which had previously discouraged committed action, but can now be approached with willingness and defusion.

Smoking was reported by participants to be the most significant obstacle currently preventing them from living a valued life. Work began to translate the abstract goal of quitting smoking into smaller, concrete actions that operationalized their valued life. Adhering to seven criteria, the therapist and participants identified personalised workable goals and constructed action plans that were linked to quitting smoking. First, actions should include ones that are likely to occasion the private experiences that participants have been previously avoided out of fear that these experiences directly cause one to smoke (e.g. anxiety-provoking situations). Exposure-based actions maximise participants' opportunities to practice willingness and defusion of difficult private events which used to rigidly prompt smoking, and so adds new response forms to their behavioural repertoire. As committed action inevitably invites difficult experiences, the therapist prepared participants for new experiential barriers (e.g. new memories, fears, learned associations, relationships) which may arise as a result of engaging in committed action so as to increase the likelihood that participants will choose to have these barriers willingly, and discussed how these barriers

can be overcome with acceptance, defusion and mindfulness skills (private valued behaviours in that they serve a valued end) while engaging in overt valued behaviour.

Second, participants were helped to construct and commit to behavioural alternatives to smoking that serve one's chosen life values, not merely the avoidance of smoking. Increasing opportunities for exposure to positive reinforcers was encouraged (e.g. increasing engagement in pleasurable activities) so long as engaging in the alternative activities and relationships are valued in themselves rather than viewed merely as a means to prevent smoking thought and behaviour. For example, going to the gym is a healthy pursuit and was encouraged if 'doing more exercise' was a part of participants' valued life. However, the therapist emphasised that using the gym or other activity primarily as a means to consume time which would otherwise be spent thinking about smoking (i.e. as a distraction) will draw participants back into viewing smoking thoughts as literal causes of smoking, and back into the unworkable agenda of avoiding difficult private events. The therapist encouraged participants to notice when they are proposing to commit to alternative behaviours for their avoidance functions rather than their value-based functions.

Third, goals should be specific and measurable so that the participant can determine whether a commitment has been kept (e.g. stop having a cigarette with breakfast). Fourth, goals should be practical, flexible, and within one's physical and intellectual capabilities. If participants suggested they may be unwilling to tolerate the levels of discomfort occasioned by total abstinence from smoking over the next few weeks, the therapist recommended they commit to smaller values-linked behaviour changes such as committing to abstaining for short periods each day, scheduled abstinence for experientially difficult times of the day, and/or gradually reducing the total number of cigarettes smoked each day. Importantly, participants should view these smaller acts of willingness as good opportunities to practice

being present with any symptoms of nicotine withdrawal and practice defusion of problem thoughts (e.g. “I can’t do this”) in service of the larger commitment to achieve total abstinence. The therapist emphasised that, though willingness to take occasional big steps will be necessary, small value-consistent steps done with intention and consistency are more workable than heroic leaps attempted every now and again.

Fifth, participants should avoid setting ‘dead man goals’, defined as ‘the goal of having or doing less of something’ (e.g. less worry, stress, and contact with certain people). Such goals lure the participant back into evaluating the ‘goodness’ and ‘badness’ of thought and actions, and subsequently to fuse with the literal truth of these evaluations. The therapist helped participants to reformulate any ‘dead man goals’ to specify what the participant does want and can measure if it occurs. By measuring valued living by the presence of valued behaviours, not by the absence of suffering, participants should come to see that quitting smoking derives its value from what it achieves for them in the broader context of their life; that is, quitting smoking is a valued action only because it serves a valued life (e.g. better health, functional relationships, financial security).

Sixth, participants were encouraged to make their commitments public, preferably by sharing their goals with friends, family and colleagues and asking for their support to ensure that participants have the best opportunity to keep these commitments. Seventh, participants were encouraged to monitor how closely their actions committed line up with their valued life direction, and be willing to revise goals that are not connected to valued ends.

Finally, as fusion and experiential avoidance are strongly supported by the social-verbal community, participants were warned that they may be tempted to relapse to their old, habitual, unworkable behaviours if new patterns of committed behaviour do not pay off in the expected way. Additionally, the given the character of nicotine-dependence as a chronic

relapsing condition, they were taught how to maintain committed action in the immediate aftermath of a slip to prevent it from turning into a full-blown relapse to smoking. The therapist emphasised that occasional smoking lapses were common amongst quitting smokers and that any one slip does not spell the end of a quit attempt, nor does it mean that one is helpless, hopeless or that one's values have changed. This was demonstrated by having participants ask themselves "So what now?" immediately following a slip. Unless they no longer valued quitting smoking, participants should realise that 'what now?' is the same as 'what before?' A slip did not mean that participants were no longer free to set their own heading, just as taking a wrong turn and driving 10 miles in the wrong direction does not mean they cannot about turn and return to the point at which they came off the right road and start again headed in the direction they still value.

Slips and relapses were conceptualised as good opportunities to examine the verbal and nonverbal behaviours that preceded the relapse, in particular, to explore through several questions whether the relapse to smoking was preceded by a relapse to old, unworkable tendencies: "Was I trying to avoid a difficult private experience? Did I smoke in response to a particular private experience? Is my mind rationalising avoidance of a particular thought or feeling?" Such questions should undermine the rationale for a return to old ways but also demonstrate that willingness, defusion and committed action require effort, particularly when experiential avoidance and cognitive fusion are well learned and strongly supported by the social-verbal community. Thus, participants were encouraged to view each slip as a learning experience, an opportunity to find out what went wrong, what could have been done better, what can be changed for the future, and, assuming their values have not changed, an opportunity to re-engage in committed action.

10.7. MEASURES

10.7.1. OUTCOME MEASURES

Given the health benefits of smoking cessation and the lack of known health benefits of smoking, Blanchard and Schwartz (1988) argue that "the only logically clinically significant change in smoking is *total cessation*" (p.180, italics in original). A workgroup formed by the Society for Research on Nicotine and Tobacco (Hughes et al., 2003) recommended that trials report multiple measures of abstinence. In line with the workgroup's recommendations, prolonged abstinence self-report – defined as continuous abstinence since the end of a post-intervention 'grace period' in which smoking is not counted as a failure as intervention effects may still be emerging – was used as the primary outcome measure of intervention efficacy, and point prevalence abstinence self-report – defined as the prevalence of abstinence during a consecutive number of days preceding an assessment, but not necessarily continuously since the end of the intervention – was used as the secondary outcome measure of intervention efficacy.

Hughes et al. (2003) recommend that prolonged abstinence be used as the primary outcome measure because it: "(a) requires a long period of abstinence; (b) it captures long-term abstainers who initially slip and (c) it can be used with treatments that have a delayed effect" (Hughes et al., 2003: 18). Point prevalence abstinence is recommended as a secondary outcome measure because it is the modal outcome measure of behavioural smoking cessation interventions and meta-analyses of these interventions tend to base treatment recommendations on smoking point prevalence data (Lancaster and Stead, 2005; Fiore et al., 2008; Hajek et al., 2009); point prevalence may better capture those who lapse

to smoking early in a quit attempt but do manage to quit later in the process, that is, it can capture delayed effects of an intervention (Velicer, Prochaska, Rossi, & Snow, 1992), and by extension, has higher power than prolonged abstinence to detect significant long-term differences between intervention samples, which is ideal for this study.

Follow-up assessments of smoking status were tied to the therapist-defined quit date, which was set for the date of participants' third group meeting. This meant that the first assessment of smoking status measured the prevalence of smoking abstinence for the ten weeks which followed the end of a two-week post-quit grace period (i.e. twelve weeks post-quit), in line with Hughes et al.'s (2003) recommendation for aid-to-cessation trials assessing prolonged abstinence status. Participants were contacted by the author by telephone three months and six months after the end of their two-week post-quit grace period to obtain their status on the two abstinence measures. Six months post-quit was chosen as the final assessment point as this is the modal assessment point used in aid-to-cessation trials and a standard criterion for inclusion in meta-analyses of smoking cessation treatment trials (Fiore et al., 2000, 2008; Hajek et al., 2009).

At each follow-up assessment, participants were asked: (1) "Starting from two weeks after the final group meeting, have you ever smoked at least a part of a cigarette on each of seven consecutive days?" (prolonged abstinence); (2) "Starting from two weeks after the final group meeting, have you smoked any cigarettes in each of two consecutive weeks?" (prolonged abstinence); and (3) "Have you smoked at least part of a cigarette in the last 30 days?" (30-day point prevalence of abstinence). Failure for prolonged abstinence was indicated by smoking on seven consecutive days *or* smoking at least once per week for two consecutive weeks, where a smoking episode was deemed to be anything over a single cigarette puff (Hughes et al., 2003). The latter part of this definition is intended to capture

those who smoke regularly but on a less-than-daily basis. Failure for point prevalence abstinence was indicated by any smoking (i.e. even a puff) on any of the thirty days preceding a follow-up assessment; the even-a-puff criterion applies to point prevalence but not to prolonged abstinence because the point prevalence measure is intended to capture a cross-sectional snapshot of abstinence (Hughes et al., 2003). Due to financial and personnel constraints, it was not possible conduct cotinine or biochemical verification checks of self-reported smoking status data. However, a meta-analysis of 26 RCTs (N = 36,830: Patrick, Cheadle, Thomson, Diehr et al., 1994) containing 51 comparisons of self-reported smoking with results of biochemical verification found generally high levels of specificity (89%) and sensitivity (87%) for self-reported data across all studies, indicating the general accuracy of self-reported smoking status. Finally, a worst-case scenario was assumed in which participants with missing data or who dropped out for any reason were regarded as being continuing smokers in statistical analyses.

10.7.2. Baseline Measures

The following measures were administered immediately prior to participants' first group meeting with the exception of the FTND which was completed during the screening interview.

10.7.2.1. Fagerstrom Test for Nicotine Dependence (FTND; α=0.61, Heatherton, Kozlowski, Frecker,& Fagerstrom, 1991)

The FTND is a six-item self-report questionnaire revised from the original Fagerstrom Tolerance Questionnaire (Fagerstrom, 1978) to measure respondents' dependence on nicotine, with scores ranging from zero (very low dependence) to ten (very high dependence). Smokers who score higher on the FTND generally report more severe withdrawal symptoms, and tend to relapse to smoking sooner than less dependent smokers (Fagerstrom, 1998).

10.7.2.2. Demographics and Smoking Characteristics Questionnaire (DSCQ: Appendix B)

Data were obtained on a number of demographic and smoking variables that have been empirically supported as predictors of smoking cessation, including age, sex, ethnicity, educational achievement, employment status, current daily smoking, age of smoking initiation, years of regular smoking, number of past quit attempts, length of longest quit period, and past use of a pharmacologic aid-to-cessation.

10.7.2.3. Profile of Mood States – Short Form (POMS-SF: a range = 0.80 to 0.91; Shacham, 1983)

The POMS-SF is a self-report measure of transient distinct mood states which retains 37 items of the original 65-item POMS (McNair, Lorr, & Dropplemann, 1971) on the basis of their internal consistency values and face validity. The POMS-SF yields a score for each

of the initial six sub-scales of the 65-item POMS – tension-anxiety, depression-dejection, anger-hostility, fatigue-inertia, vigour-activity, and confusion-bewilderment – and a score for total mood disturbance, which is calculated by subtracting the score on the vigour-activity subscale from the sum of scores for the other five sub-scales. Respondents rate 37 adjectives on a 5-point Likert scale (0 = not at all, to 4 = extremely) on the basis of how they have been feeling in the past week including at the present moment, with higher summed scores on each sub-scale except for vigour-activity indicating higher mood disturbance. Internal consistency values range from 0.80 to 0.91 for the POMS-SF subscales, and from 0.74 to 0.91 for the 65-item POMS (Shacham, 1983). Curran, Andrykowski, and Studts (1995) reported similarly high internal consistency values for the POMS-SF and positive correlations between the Total Mood Disturbance scores of the POMS-SF and original POMS exceeding $r = 0.95$ in five clinical samples and one healthy sample ($N = 600$).

The POMS-SF is not a nicotine withdrawal measure per se, however a total of 26 items across four subscales (anger, anxiety, confusion, depression) assess the affective symptoms of nicotine withdrawal. Patten and Martin (1996) state that the 65-item POMS "may be the most psychometrically sound of any instrument used to assess tobacco withdrawal", and that "the POMS should be included in any comparison of the self-report measures of tobacco withdrawal" (p105). As the POMS-SF preserves the initial six-factor structure and yields similar or higher internal consistency values than the more time-consuming 65-item POMS, the POMS-SF has been suggested as an excellent alternative for use with clinical patients who have difficulty completing lengthy questionnaires or as part of multi-instrument assessment periods (Curran et al., 1995).

10.7.2.4. Wisconsin Smoking Withdrawal Scale (Welsch, Smith, Wetter, Jorenby et al., 1999)

The 28-item WSWS taps seven major symptom elements of the nicotine withdrawal syndrome: anger, anxiety, concentration, hunger, sleep, sadness, and craving. Respondents rate their agreement with each item for the past 24-hours on a 5-point Likert scale (0 = strongly disagree to 4 = strongly agree). Mean scores for each withdrawal element and an overall mean score for all elements are calculated, with higher scores (some items reverse scored) indicating a more severe experience of the recognised symptoms and other signs of tobacco withdrawal. Welsch et al. (1999) report post-quit internal consistency values for the subscales in two large smoking cessation trials ranging from 0.73 to 0.93, and internal consistency values for the total scale 0.91 and 0.90 for trials 1 and 2, respectively. Confirmatory factor analyses of WSWS data also revealed a seven-factor structure and factor loadings which supported the *a priori* construction of WSWS subscales.

10.7.3. Measures of Putative Mediator Variables

The Coping Strategies Scale (CSS) and Avoidance and Inflexibility Scale (AIS) measured variables which were hypothesised to mediate the effects of CBST and ACT on smoking outcomes, respectively. Both measures were administered immediately prior to participants' first therapy meeting and re-administered at one week post-quit, the time at which participants were expected to be enacting in their daily lives all the skills learned during the intervention period. These measures are described below.

10.7.3.1. Coping Strategies Scale, adapted for smoking behaviour (CSS: α = 0.95, Litt, Kadden, Cooney, & Kabela, 2003)

The 57-item CSS used in the present study was a smoking-focused version of Litt et al.'s (2003) 59-item CSS. Items which referred to drinking alcohol in the original CSS were reworded to refer to smoking. The two items which were not retained for rewording referred to use of adjunctive treatments for alcoholism ("I take a medication that help me to keep from drinking (e.g., Revia, Antabuse)" and "I attend Alcoholics Anonymous meetings (or similar meetings)") on the basis that concurrent use of other smoking cessation treatments was an exclusion criterion for the present study.

This adapted CSS measured the frequency with which the respondent had used a number of cognitive and behavioural coping strategies in situations which had normally led to smoking in the past month. CSS items refer to strategies which people might use to help keep them from smoking, many of which are explicitly trained as part of CBST for smoking cessation, such as "I ask people not to offer me a cigarette" and "I stay away from places or situations that are associated with my smoking". Respondents rate on a four-point Likert scale (1 = never to 4 = frequently) the frequency with which they have used of each coping strategy to help them not smoke in the past three months. As recipients of CBST are not expected to report an increased use of all 59 strategies at post-intervention, total coping is indicated by the mean score for all 59 items, with higher mean scores indicating more frequent use of coping strategies.

In Litt et al.'s (2003) study, two independent raters sorted the CSS items into four theory-derived coping subscales (kappa for sorting process = 0.76): active-cognitive (25 items); active-behavioural (sixteen items); avoidant-cognitive (ten items); and avoidant-

behavioural (seven items). However, when scores for active and avoidant items were summed and averaged to give mean scores for cognitive and behavioural coping, the correlation between cognitive and behavioural skills was so high (r = 0.82) that the authors deemed the distinction to be meaningless. The correlation between the active and avoidant coping dimensions was also high (r = 0.70) but these "were retained for analysis due to their theoretical distinctiveness" (p.120). One further dimension was extracted from the items based on Lazarus' (1984) distinction between problem-focused (27 items) versus emotion-focused (32 items) coping strategies. Litt et al. (2003) recommended that mean scores for total coping, active and avoidant coping, and problem-focused and emotion-focused coping be examined as possible mediators (five in total) of CBST and non-CBST treatment outcomes.

10.7.3.2. Avoidance and Inflexibility Scale (AIS: α = 0.93, Gifford et al., 2002)

The thirteen-item AIS measures the respondent's endorsement of avoidance strategies related to smoking and smoking cessation. The AIS comprises three subscales which respectively assess the respondent's tendency to respond with avoidance and inflexibility to smoking thoughts, feelings, and bodily sensations (e.g. craving). Higher scores on the AIS subscales indicate a stronger tendency to avoid interoceptive cues to smoking, and a more rigid belief that interoceptive cues are literal causes of their smoking. The AIS is perhaps best conceptualised as a smoking-focussed version of the Acceptance and Action Questionnaire (Hayes, Strosahl, Wilson, Bissett et al., 2004), which measures change in respondents' experiential avoidance and psychological flexibility, or more

specifically, “the degree to which an individual fuses with thoughts, avoids feelings, and is unable to act in the presence of difficult private events” (Hayes et al., 2006: 10). Post-ACT scores of the AAQ has been found to mediate a large number of psychological and behavioural outcomes (see Hayes et al., 2006 for a review).

10.7.4. Treatment Fidelity Measures

10.7.4.1. Client Satisfaction Questionnaire-8 (CSQ-8, α = 0.92, Larsen, Attkison, Hargreaves, & Nguyen, 1979)

Participants’ rated their satisfaction with the support and training they had received at the conclusion of the third group meeting on the 8-item CSQ-8. Items include “did you get the kind of service you wanted?” and “have the services you received helped you to deal more effectively with your problems?” Respondents rate their satisfaction on a 4-point Likert scale, with higher total scores indicating a higher degree of satisfaction with services received. In addition to the CSQ-8, participants’ enactment of treatment skills was assessed through the question: “Over the past three weeks, have you regularly practiced the skills and techniques you have learned at these meetings in your daily life?” (dichotomous response: yes/no).

10.7.4.2. Adapted Drexel University ACT/CBT Therapist Adherence Rating Scale (DUTARS: McGrath, Forman, del Mar Cabiya, Hoffman et al., 2005)

All therapy meetings were audio-recorded and a 20% random sample of recordings (five CBST meetings and five ACT meetings) were assessed by two independent raters for the therapist's adherence to the therapy manuals, the discriminability of CBST and ACT meetings, and non-specific therapist factors. The two raters were clinical psychologists at the University of Glasgow, each with more than two years of post-doctoral experience the delivery and supervision of ACT and CBT for psychoses and a range of affective disorders.

Therapist adherence was assessed using the Drexel University ACT/CBT Therapist Adherence Rating Scale (DUTARS: McGrath et al., 2005), adapted for use in the present study to refer specifically to the relationship between smoking-related cognition and behaviour. The DUTARS measures the presence or absence of 36 therapist behaviours at five-minute intervals, with each behavior belonging to one of six broader classes of therapist behavior: relationship-building, treatment implementation, CBST-specific behaviour, ACT-specific behaviour, miscellaneous therapist behaviours, and therapist competence. The DUTARS in the only instrument known to assess the extent to which core CBST and ACT-specific processes are covered in therapy sessions. McGrath et al. (2005) reported excellent levels of inter-rater reliability (full scale ICC = 0.95; subscale ICCs > 0.86) and internal consistency (full scale $\alpha = 0.92$; subscale α's > 0.91) for the DUTARS.

10.8. Data Analysis Plan

All data analyses were conducted using IBM SPSS 19.0 software. As the primary purpose of this study was to compare the rates of long-term smoking abstinence produced by ACT, a brand of behavioural therapy which is not yet empirically supported for smoking

cessation, against CBST, an empirically-supported behavioural intervention for smoking cessation, efficacy analyses were conducted on prolonged and point prevalence abstinence outcome data. Efficacy analyses indicate the significance of the difference on the outcome variable between the two interventions only for those who participated *and* provided data. Consistent with general guidelines (Hollis & Campbell, 1999) to correct for possible bias due to missing data, intent-to-treat analyses (ITT) were also conducted on all participants randomly assigned to receive either CBST (n = 37) or ACT (n = 42), with all missing outcome data re-coded as 'still smoking' under the worst-case assumption of no change.

CHAPTER ELEVEN: RESULTS OF THE INTERVENTION PHASE

11.1. SAMPLE CHARACTERISTICS

The majority of participants were female (73.4%) and all participants reported their ethnicity as 'white'. Mean age was 34 years, 9 months (SD = 7.03; range: 22 years, 3 months to 52 years, 4 months). Most participants (67.1%) were unmarried, 27.8% were married/living with a partner, 3.8% were separated/divorced, and 1.3% was widowed. Most participants were in full time employment (77.2%), 7.6% were unemployed, and 15.2% were full time students. Four per cent of participants held no formal educational qualifications, 35.8% had obtained GCSEs, 26.6% had obtained A-levels, 25.3% had obtained a university degree, and 5.1% had obtained a university postgraduate degree.

Participants started smoking regularly aged 16 years, 9 months on average (SD = 2.50) and had, on average, been smoking regularly for 17 years, 0 months (SD = 6.86). Participants smoked an average of 21.20 cigarettes[24] per day (*SD* = 6.83, range: 12 to 40) and had made an average of 2.53 past attempts to quit in the past two years which had lasted more than one day. The length of longest quit period in the past two years varied widely, with the 25th percentile quitting for 4.1 days, the 50th percentile for 23 days, and the 75th percentile for 202.11 days. Almost half (44.30%) of participants reported having used some form of nicotine replacement therapy or other medication to assist past quit attempts, a rate which is slightly less than double the 23% U.K. average for 2008-2009 (Lader, 2009). Average score on the FTND was 6.27 (SD = 1.02).

11.2. EQUIVALENCE OF CBST AND ACT GROUPS

Differences between CBST and ACT participants on a number of empirically supported predictors of smoking cessation at intake were examined using chi-square tests for categorical variables and independent samples *t*-tests for continuous variables. Groups were compared on demographic variables (age, sex, educational attainment, employment status, marital status), smoking history variables (FTND score, regular daily cigarette consumption, smoking start age, years of regular smoking, number of past quit attempts, length of longest quit, and ever use of NRT), affective variables (score on each of the six sub-scales of the POMS-SF, plus the score for the POMS-SF total mood disturbance) and nicotine withdrawal variables (score on each of the seven sub-scales of the WSWS).

[24] Machine-rolled.

Statistically significant group differences were found on two variables; ACT participants were significantly older (t (77) = 2.27, p = 0.026) and had been smoking regularly for significantly more years (t (77) = 2.86, p = 0.006) than CBST participants. Descriptive statistics for each baseline variable are summarised by intervention group in table 3.

TABLE 3. DEMOGRAPHIC, SMOKING HISTORY AND AFFECTIVE CHARACTERISTICS OF ALL RANDOMISED PARTICIPANTS, STRATIFIED BY INTERVENTION.

Variable	CBST (N = 37)	ACT (N = 42)	Total (N = 79)
Categorical variables	*N (%)*	*N (%)*	*N (%)*
Sex			
Male	11 (29.7)	10 (23.8)	21 (26.6)
Female	26 (70.3)	32 (76.2)	58 (73.4)
Marital status			
Single	22 (59.5)	31 (73.8)	53 (67.1)
Married/LWP	13 (35.1)	9 (21.4)	22 (27.8)
Separated/divorced	1 (2.7)	2 (4.8)	3 (3.8)
Widowed	1 (2.7)	0 (0.0)	1 (1.3)
Current employment status			
Full-time	29 (78.4)	32 (76.2)	61 (77.2)
Unemployed	4 (10.8)	2 (4.8)	6 (7.6)
Full-time student	4 (10.8)	8 (19.0)	12 (15.2)
Highest educational qualification			
No qualifications	1 (2.7)	2 (4.8)	3 (3.8)
GCSE	17 (45.9)	11 (26.2)	28 (35.4)
A-levels	10 (27.0)	11 (26.2)	21 (26.6)
Undergraduate degree	8 (21.6)	12 (28.6)	20 (25.3)
Postgraduate degree	0 (0.0)	4 (9.5)	4 (5.1)

Doctorate	1 (2.7)	1 (2.4)	2 (2.5)
Other	0 (0.0)	1 (2.4)	1 (1.3)
Ever use of pharmacotherapy			
Yes	18 (48.6)	25 (59.5)	44 (55.7)
No	19 (51.4)	17 (40.5)	35 (44.3)
Continuous variables	*M (SD)*	*M (SD)*	*M (SD)*
Age*	33.0 (5.86)	36.5 (7.61)	34.86 (7.03)
Cigarettes smoked daily	21.41 (7.60)	21.02 (6.16)	21.20 (6.83)
Age of smoking initiation	16.84 (2.13)	16.81 (2.74)	16.82 (2.46)
Years of regular smoking**	14.51 (6.12)	18.21 (5.40)	16.48 (6.01)
Serious past quit attempts	2.54 (0.96)	2.52 (1.27)	2.53 (1.13)
Longest quit length (days)	85.97 (91.99)	65.26 (78.66)	74.96 (85.24)
FTND	6.41 (1.00)	6.14 (1.05)	6.27 (1.02)
POMS-SF			
Total Mood Disturbance	34.52 (3.68)	34.61 (3.42)	34.57 (3.52)
Tension-Anxiety	12.52 (1.34)	11.92 (1.81)	12.19 (1.63)
Depression-Dejection	9.97 (1.33)	9.81 (0.82)	9.88 (1.08)
Anger-Hostility	9.58 (1.03)	9.72 (1.03)	9.66 (1.03)
Vigour-Activity	14.97 (1.05)	14.83 (1.34)	14.90 (1.21)
Fatigue-Inertia	8.39 (1.23)	8.75 (1.50)	8.58 (1.38)
Confusion-Bewilderment	9.03 (1.05)	9.25 (1.00)	9.15 (1.01)
WSWS			
Total	2.54 (0.20)	2.49 (0.27)	2.51 (0.24)
Anger	2.24 (0.47)	2.16 (0.42)	2.19 (0.44)
Anxiety	1.75 (0.39)	1.71 (0.43)	1.73 (0.41)
Concentration	1.56 (0.38)	1.63 (0.36)	1.60 (0.37)
Craving	3.67 (0.22)	3.51 (0.45)	3.59 (0.37)
Hunger	1.39 (0.26)	1.26 (0.30)	1.32 (0.29)
Sadness	0.94 (0.27)	1.08 (0.34)	1.02 (0.31)
Sleep	1.14 (0.20)	1.08 (0.26)	1.11 (0.24)

Note. Differences between intervention groups were tested using chi-square tests for categorical variables and independent samples *t*-tests for continuous variables.
CBST = Cognitive behavioural coping skills training; ACT = Acceptance and Commitment Therapy.

*p < .05; **p < .01; ***p < .001.

11.3. THERAPY ATTENDANCE

The three CBST meetings were comparably well attended: 31 (83.80%) participants attended *meeting one*; 28 (75.70%) attended *meeting two*; and 29 (78.40%) attended *meeting three*. The three ACT meetings were also comparably well attended: 36 (85.70%) attended *meeting one*; 32 (76.20%) attended *meeting two*; and 32 (76.20%) attended *meeting three*. Attendance at any meeting did not significantly differ between the two interventions (χ^2s (1) < 0.57, *p*s > 0.811).

Participants were considered to be intervention completers if they attended all three meetings. Of the 79 randomised participants, five (13.50%) assigned to CBST and five (11.90%) assigned to ACT did not attend a single meeting, and a further two (5.40%) in CBST and three (7.10%) in ACT dropped out after the first meeting. There were 26 (70.30%) CBST completers and 29 (69.00%) ACT completers. Attrition rates from smoking cessation trials range from 10-50% depending on number of treatment sessions (Curtis, Brown, & Sales, 2000), which places the present non-completion rates of 29.70% (CBST) and 31.00% (ACT) in the high normal range. The total number of meetings attended did not significantly differ between the two interventions (CBST M = 2.38, SD = 1.09; ACT M = 2.38, SD = 1.06, *t* (77) = 0.01, p = 0.992).

11.4. ATTRITION FROM FOLLOW-UP ASSESSMENT

A total of 67 (84.80%) participants completed the two mediation measures at post-intervention: 31 (83.80%) in CBST and 36 (85.70%) in ACT. Smoking outcome data were reported by a total of 59 (74.68%) at both follow-ups and by 66 (83.54%) at one or more follow-up. The remaining 13 (16.46%) did not report outcome data at either follow-up assessment. Separate logistic regression analyses conducted for each follow-up confirmed that completers were significantly more likely than non-completers to provide outcome data at each follow-up (*p*s <0.001). Rates of attrition from follow-up assessment decreased only slightly across the two follow-ups (three month n = 20, 25.32%; six month n = 22, 29.85%). In the context of behavioural smoking cessation interventions, a loss of 29.85% of participants to follow-up after six months post-intervention falls in the high normal range (Hajek et al., 2009).

Of the 37 participants randomised to CBST, outcome data were reported by 30 (80.08%) and 26 (70.27%) at the three and six month follow-ups, respectively. Of the 42 participants randomised to ACT, outcome data were reported by 29 (69.05%) and 31 (73.81%) at the three and six month follow-ups, respectively. Rates of attrition from follow-up did not significantly differ between CBST and ACT at either follow-up (χ^2*s* (79) < 1.51, *p*s > 0.220).

11.5. THERAPY ACCEPTABILITY

CBST and ACT participants were highly and comparably satisfied with the support and training they had received over the three-week intervention period (CSQ-8) (CBST M = 23.83, SD = 2.19, ACT M = 23.69, SD = 2.02, *t* (59) = 0.26, 0.331). At one-week post

intervention, the majority of participants reported that they had regularly applied their learned skills and techniques in their daily lives throughout the intervention period (CBST = 82.1%, ACT = 75.0%, χ^2 (1) = 0.45, p = 0.503).

11.6. Therapist Adherence to Intervention Manuals

Inter-rater agreement on the presence of CBST- and ACT-specific therapist behaviours at five-minute intervals was estimated using Shrout and Fleiss' (1979) intraclass correlation coefficients (ICCs) model two in which the two raters were treated as random effects. Results showed that the raters were able to successfully differentiate ACT meetings and CBST meetings on 100% of meetings coded. The therapist spent an average of 41.4% of ACT meetings and 38.8% of CBST meetings covering content specified in their respective manuals, and no time on behaviours specified in the non-assigned manual. All core techniques specified for delivery at each meeting (table 2) were rated as having been covered at 100% of meetings coded. The two raters showed very high agreement in their assessment of the extent to which the therapist showed CBST-specific behaviours at CBST meetings (ICC = 0.92, $p < 0.001$) and ACT-specific behaviours at ACT meetings (ICC = 0.94, $p < 0.001$). On a 5-point scale, overall therapist competence was rated as either "very good (4)" or "excellent (5)" for 100% of rated meetings. Overall, results indicate that CBST and ACT meetings were highly distinct and delivered as specified in their respective manuals, with no errors of omission or commission in the delivery of either manual.

11.7. Effect of Intervention on Smoking Outcomes

Differences between the rates of prolonged and 30-day point prevalence smoking abstinence associated with CBST and ACT at three month and six month follow-ups were examined through separate hierarchical logistic regression analyses, with each analysis conducted in three steps. Prolonged abstinence (0 = still smoking, 1 = abstinent) and 30-day abstinence (0 = still smoking, 1 = abstinent) were entered as the criterion variables in separate regressions. To control for their effects, age, number of cigarettes smoked per day, years of regular smoking, FTND total, WSWS total, and POMS-SF total mood disturbance were entered as covariates at step one. Intervention type (CBST = 0, ACT = 1) and participants' frequencies of paradoxical errors made on the motor control (PD-MC) and motion timing (PD-MT) behavioural tasks were entered at step two. Finally, to assess any moderation of the effect of intervention type on smoking outcomes by participants' paradoxical processing tendencies, two interaction terms were entered at step three: intervention type with each of participants' frequencies of paradoxical errors made on the motor control (PD-MC) and motion timing (PD-MT) behavioural tasks. Odds ratios in these regressions indicate the proportionate increase in odds of smoking abstinence associated with the indicator on each the intervention type variable (or, for continuous variables, the proportionate change associated with each unit change in the predictor variable). Abstinence rates, odds ratios and their associated two-sided *p* values, adjusted and unadjusted for covariates in step one, for efficacy and intent-to-treat analyses are summarised in table 4.

TABLE 4. COMPARISONS OF (A) PROLONGED ABSTINENCE RATES AND (B) PAST 30-DAY POINT PREVALENCE ABSTINENCE RATES, ODDS RATIOS, AND TWO-SIDED *P* VALUES ASSOCIATED WITH CBST AND ACT AT THREE MONTHS AND SIX MONTHS FOLLOW-UP.

(a) FU	CBST	ACT	Adj. OR[a]	*p*	Unadj. OR	*p*
Efficacy sample						
Three months (N = 59)	8/30 (26.67%)	8/29 (27.59%)	0.56	0.415	1.05	0.937
Six months (N = 57)	4/26 (15.38%)	8/31 (25.81%)	1.59	0.553	1.91	0.341
ITT sample						
Three months	8/37 (21.62%)	8/42 (19.05%)	0.58	0.384	0.85	0.776
Six months	4/37 (10.81%)	8/42 (19.05%)	1.68	0.470	1.94	0.314
(b) FU	CBST	ACT	Adj. OR[a]	*p*	Unadj. OR	*p*
Efficacy sample						
Three months (N = 59)	11/30 (36.67%)	15/29 (51.72%)	1.24	0.726	1.85	0.246
Six months (N = 57)	4/26 (15.38%)	12/31 (38.71%)	3.47	0.058	3.48	0.047
ITT sample						
Three months	11/37 (29.72%)	15/42 (35.71%)	0.94	0.917	1.31	0.573
Six months	4/37 (10.81%)	12/42 (28.57%)	3.31	0.080	3.30	0.058

[a] Adjusted for age, daily smoking, years of regular smoking, FTND, WSWS, and POMS-SF Total Mood Disturbance.

11.7.1. Primary Outcome: Prolonged Abstinence

Controlling for variables in step one, the rates of prolonged abstinence associated with CBST and ACT were statistically equivalent at three month follow-up (26.67% vs. 27.58% abstinent, Wald χ^2 (1, N = 59) = 0.66, p = 0.415, OR = 0.56, CI95: 0.14 to 2.27) and six month follow-up-month (15.38% vs. 25.81% abstinent, Wald χ^2 (1, N = 57) = 0.40, p = 0.553, OR = 1.59, CI95: 0.40 to 3.45). Neither paradoxical tendencies shown on the motor control task nor the motion timing task significantly predicted prolonged abstinence at either follow-up. Neither interaction term entered at step three significantly predicted prolonged abstinence status at either follow-up assessment. Thus, contrary to hypothesis, neither paradoxical tendencies on the motor control nor the motion timing tasks appeared to moderate CBST or ACT's efficacy for prolonging smoking abstinence up to three months or six months post-quit.

An intent-to-treat analysis in which all missing data were re-coded as 'still smoking' also revealed rates of prolonged abstinence associated with CBST and ACT which were statistically equivalent at three month follow-up (21.62% vs. 19.04% abstinent, Wald χ^2 (1, N = 79) = 0.76, p = 0.384, adjusted OR = 0.58, CI95: 0.17 to 1.97) and six month follow-up (10.81% vs. 19.04% abstinent, Wald χ^2 (1, N = 79) = 0.55, p = 0.460, adjusted OR = 1.68, CI95: 0.43 to 6.57). Model information for all logistic regression analyses of prolonged abstinence outcomes is summarised in table 5.

11.7.2. Secondary Outcome: Past 30-day Point Prevalence Abstinence

Controlling for variables in step one, the rates of past 30-day abstinence associated with ACT and CBST were statistically equivalent at three month follow-up (51.72% vs. 36.67% abstinent, Wald χ^2 (1, N = 59) = 0.12, p = 0.726, OR = 1.24, CI95: 0.37 to 4.13). However, ACT participants were 3.47 times more likely than CBST participants to have not smoked in any of the thirty days prior to the six month follow-up, an effect which was statistically significant at the 94% confidence level (38.71% vs.15.38% abstinent, Wald χ^2 (1, N = 57) = 2.56, p = 0.058, OR = 3.47, CI95: 0.77 to 6.55). Neither paradoxical tendencies shown on the motor control task nor the motion timing task significantly predicted 30-day abstinence at either follow-up. No interaction term entered at step three significantly predicted abstinence status at either follow-up, indicating that paradoxical error tendencies on neither the motor control nor the motion timing task moderated CBST's or ACT's efficacy for 30-day abstinence at either follow-up. Logistic regression model information for past 30-day abstinence outcomes is summarised in table 6.

Intent-to-treat analyses, too, revealed rates of 30-day abstinence associated with CBST and ACT which were statistically equivalent at three month follow-up (29.73% vs. 35.71%, Wald χ^2 (1, N = 79) = 0.01, p = 0.917, OR = 0.94, CI95: 0.32 to 2.83) and six month follow-up (10.81% vs. 28.57%, Wald χ^2 (1, N = 79) = 3.06, p = 0.080, OR = 3.31, CI95: 0.87 to 12.68).

TABLE 5. MODEL INFORMATION FOR LOGISTIC REGRESSION ANALYSES OF PROLONGED ABSTINENCE OUTCOMES AT THREE MONTHS AND SIX MONTHS FOLLOW-UP.

		3-months			6-months		
Step	Predictor	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
1	Age	0.99	0.99	0.99	0.96	0.96	0.98
	Daily smoking	1.04	1.04	1.03	1.06	1.06	1.06
	Years of regular smoking	1.11	1.14	1.12	1.09	1.08	1.05
	FTND	0.93	0.88	0.85	0.75	0.78	0.72
	WSWS	0.15	0.12	0.11	0.60	0.68	0.76
	POMS-SF Tot. Mood Disturb.	0.94	0.93	0.92	0.98	0.99	1.02
3-months: $\chi^2 = 6.07$, df = 6, p = 0.415							
6-months: $\chi^2 = 1.98$, df = 6, p = 0.921							
2	Intervention	-	0.56	0.88	-	1.59	0.65
	PD-MC	-	0.92	0.95	-	0.84	0.89
	PD-MT	-	1.03	1.01	-	1.15	1.05
3-months: $\chi^2 = 0.48$, df = 3, p = 0.520							
6-months: $\chi^2 = 0.36$, df = 3, p = 0.954							
3	Intervention X PD-MC	-	-	0.94	-	-	0.99
	Intervention X PD-MT	-	-	1.01	-	-	0.97

3-months: $\chi^2 = 2.94$, df = 2, p = 0.567	
6-months: $\chi^2 = 0.95$, df = 2, p = 0.917	

*p < .05; **p < .01; ***p < .001 Note: All χ^2 statistics reported for the omnibus test. Cell values indicate the odds ratios.

TABLE 6. MODEL INFORMATION FOR SEPARATE HIERARCHICAL LOGISTIC REGRESSION ANALYSES OF 30-DAY ABSTINENCE OUTCOMES AT THREE MONTHS AND SIX MONTHS FOLLOW-UP.

		3-months			6-months		
Step	Predictor	Step 1	Step 2	Step 3	Step 1	Step 2	Step 3
1	Age	1.00	1.00	0.98	0.97	0.97	1.00
	Daily smoking	1.03	1.03	1.02	1.07	1.07	1.08
	Years of regular smoking	1.12	1.11	1.16	1.08	1.05	1.00
	FTND	0.89	0.90	0.88	0.76	0.84	0.75
	WSWS	0.59	0.61	0.22	0.24	0.31	0.29
	POMS-SF Tot. Mood Disturb.	0.93	0.93	0.91	0.96	0.98	1.03
3-months: $\chi^2 = 6.00$, df = 6, p = 0.423							
6-months: $\chi^2 = 3.64$, df = 6, p = 0.725							
2	Intervention	-	1.24	0.83	-	3.47	1.08
	PD-MC	-	1.16	1.06	-	1.18	1.10
	PD-MT	-	1.09	1.04	-	1.09	1.13
3-months: $\chi^2 = 0.11$, df = 3, p = 0.748							
6-months: $\chi^2 = 2.68$, df = 3, p = 0.098							
3	Intervention X PD-MC	-	-	0.94	-	-	1.00
	Intervention X PD-MT	-	-	1.04	-	-	0.96

3-months: $\chi^2 = 3.25$, df = 2, p = 0.517	
6-months: $\chi^2 = 2.71$, df = 2, p = 0.608	

*p < .05; **p < .01; ***p < .001 Note: All χ^2 statistics reported for the omnibus test. Cell values indicate the odds ratios.

11.8. MEDIATION ANALYSES

11.8.1 INFLUENCE OF INTERVENTION ON MEDIATOR VARIABLES

Descriptive statistics for all variables tested as mediators of smoking outcomes are summarised in table 7. Independent samples *t*-tests indicated CBST and ACT did not significantly differ on any mediator at baseline (*t*s (65) = -1.70 >< 0, *p*s > 0.093). Analyses of covariance which controlled for baseline mediator scores in the efficacy sample indicated that the ACT intervention produced a significantly lower AIS-total score (F (1, 55) = 78.43, p < 0.001); AIS-thoughts score (F (1, 55) = 49.99, p < 0.001); AIS-feelings (F (1, 55) = 53.47, p < 0.001); and AIS-cravings (F (1, 55) = 39.57, p < 0.001) than the CBST intervention at post-intervention. In addition, ACT participants baseline to post-intervention reductions in avoidance of smoking-related internal experiences were extremely large in magnitude (*d*s = 1.10 to 1.87).

In contrast, the CBST intervention produced a significantly higher CSS-total score (F (1, 55) = 7.02, p = 0.010); CSS-active score (F (1, 55) = 6.53, p = 0.013); CSS-avoidant score (F (1, 55) = 6.01, p = 0.017); CSS-problem-focused score (F (1, 55) = 8.68, p = 0.005); and CSS-emotion-focused score (F (1, 55) = 4.75, p = 0.034) than the ACT intervention at post-intervention. However, CBST participants showed only small baseline to post-intervention increases in their use of different types of coping strategy (*d*s = 0.04 to 0.29).

These results indicate that the ACT intervention was highly effective in reducing avoidance tendencies, whereas the CBST intervention was only minimally effective in increasing participants' use of coping strategies. The next step was to examine whether, when

controlling for baseline values, avoidance tendencies and levels of coping at post-intervention predicted smoking outcomes at six month follow-up.

TABLE 7. DESCRIPTIVE STATISTICS FOR PUTATIVE MEDIATOR VARIABLES AT BASELINE AND POST-INTERVENTION, STRATIFIED BY INTERVENTION.

	Mean (SD)		
Mediator	Baseline	Post-intervention	Cohen's *d*
AIS-total			
CBST	49.61 (3.69)	50.14 (2.67)	0.16
ACT	48.03 (6.36)	36.34 (7.49)	1.76
AIS-thoughts			
CBST	14.77 (2.16)	15.24 (1.60)	0.25
ACT	14.25 (2.82)	11.32 (2.50)	1.10
AIS-feelings			
CBST	18.19 (2.09)	19.41 (2.00)	0.60
ACT	17.58 (2.55)	14.13 (3.15)	1.20
AIS-cravings			
CBST	16.64 (1.43)	15.48 (1.88)	0.69
ACT	16.19 (2.29)	11.10 (3.09)	1.87
CSS-total			
CBST	2.31 (0.24)	2.35 (0.23)	0.17
ACT	2.24 (0.26)	2.14 (0.33)	0.34
CSS-active			
CBST	2.32 (0.22)	2.33 (0.24)	0.04
ACT	2.24 (0.24)	2.12 (0.34)	0.41
CSS-avoid			
CBST	2.30 (0.29)	2.37 (0.26)	0.23

ACT	2.23 (0.31)	2.16 (0.34)	0.22
CSS-prob.			
CBST	2.30 (0.27)	2.38 (0.28)	0.29
ACT	2.25 (0.25)	2.15 (0.31)	0.36
CSS-emo.			
CBST	2.33 (0.23)	2.31 (0.26)	0.08
ACT	2.23 (0.25)	2.10 (0.37)	0.41

Note: CBST = Cognitive-behavioural coping skills training; ACT = Acceptance and Commitment Therapy; baseline CBST N = 31; baseline ACT N = 36; post-intervention CBST N =29; post-intervention ACT N = 31.

11.8.2. Influence of Mediators on Outcomes

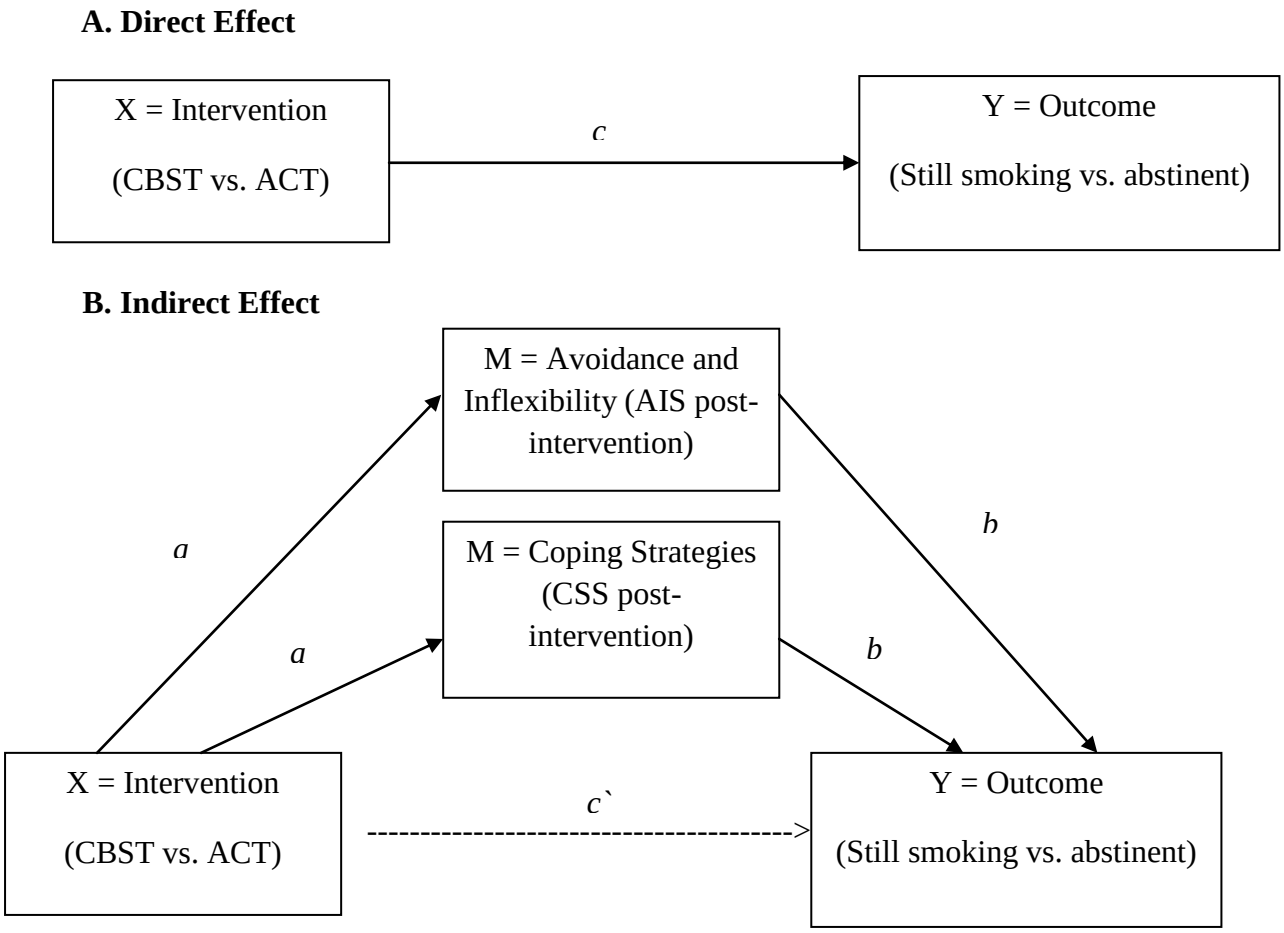
Following the mediation analytic strategies of Flaxman and Bond (2010) and Gaudiano, Herbert, and Hayes (2010), mediation analyses in the present study were conducted using Preacher and Hayes' (2008) nonparametric bootstrapping (resampling) method (figure 2) to test the statistical significance of the cross-product of the intervention-mediator relation and the mediator-outcome relation controlling for effect of intervention, known as the indirect effect. Preacher and Hayes' indirect method of examining mediation was chosen for several reasons.

Mediation analysis is concerned with the difference between the direct effect of intervention (X) on outcome (Y), known as the *c* path, and the indirect effect of intervention (X) on outcome (Y) after controlling for the effect of the mediator variable (M) on outcome (Y), known as the *c'* path ($c' = c - (a*b)$). The size of the indirect effect is determined by the size of the cross-product ($a*b$) of the effect of intervention (X) on outcome (Y), known as the *a* path, and the effect of the mediator (M) on outcome (Y) after controlling for the effect of

intervention (i.e. M[X] – Y), known as the *b* path. Statistical mediation is seen to have occurred when the difference between the indirect and the direct effect ($c - c'$) is statistically significant. In finite data sets, the, the cross-product of the *a* and *b* coefficients produced by Preacher and Hayes' indirect method is generally equal to the difference between the indirect effect and the direct effect, and is therefore suggested to be a superior test of mediation in two ways to Baron and Kenny's[25] (1986) more common and intuitively appealing method of testing mediation through a series of regressions in which statistical mediation is presumed to have occurred if the *a*, *b*, and *c* paths are significant but the *c'* path is not: first, Baron and Kenny's 'causal steps' method never formally tests whether the indirect effect is significantly different from the direct effect (MacKinnon, Fritz, Williams, & Lockwood, 2007); and second, their method, which involves separately testing the significance of the *a* and *b* paths, does not control for the fact that as the coefficient for the *a* path grows larger, the coefficient for the *b* path mathematically must become smaller, and vice versa (Preacher & Hayes, 2008).

Additionally, small samples are often characterised by considerable variability between individuals which reduces power to detect statistical significance where it may exist. Bootstrapping overcomes this problem by deriving a large number of predicted values from a smaller sample of observed values so as to approximate the values one might expect to find at a 'population level'. Thus, Preacher and Hayes' method of testing the significance of the cross-product of the *a* and *b* coefficients is now widely acknowledged to be the best, most direct test of mediation (MacKinnon, Fairchild, & Fritz, 2007).

[25] Preacher and Hayes (2008) recommend that mediation effects be examined by testing the significance of the indirect effect as opposed to through Baron and Kenny's (1986) series of causal steps when a model of multiple putative mediators is sought, when testing mediation in smaller samples and, when sampling from non-normal distributions. A full discussion of how the indirect method resolves the statistical limitations of the more popular test of mediation described by Baron and Kenny (1986) can be found in Preacher and Hayes (2004, 2008).



Note: CBST = Cognitive-behavioural Coping Skills Training; ACT = Acceptance and Commitment Therapy.

FIGURE 2. MODEL OF PREACHER AND HAYES' (2008) INDIRECT METHOD FOR TESTING MULTIPLE MEDIATION (M) OF THE EFFECT OF INTERVENTION (X) ON SMOKING OUTCOME (Y).

11.8.3. Multiple Mediation Models and Hypotheses

In the present mediation analysis, the specific indirect effects of intervention (CBST = 0; ACT = 1) on smoking status (0 = still smoking; 1 = abstinent) through post-intervention AIS-total (M) and CSS-total (M) scores were examined simultaneously within a multiple mediator model; a separate model was estimated for each of the two outcome variables reported at six month follow-up. To control for their effects, baseline AIS-total and CSS-total scores and baseline daily cigarette consumption were entered as covariates. These multiple mediator models generated contrasts which compared the relative strengths of the indirect effects through each mediator; that is, the significance of the difference between the unique abilities of the AIS-total and CSS-total to mediate the effect of intervention on smoking status. In this method, the indirect effect (*a***b*) is significant (i.e. full mediation has occurred) if the upper and lower bounds of the bias-corrected and accelerated (BCa) 95% confidence intervals do not contain zero, i.e. both bounds fall on the same side of zero (Efrom & Tibshirani, 1993).

Mediation effects were hypothesised to occur in line with theoretical assumptions about the active ingredients of the CBST and ACT interventions. First, post-intervention CSS total score was predicted to be a stronger mediator of CBST outcomes than of ACT outcomes. For this effect to occur, the CBST intervention was required to be more strongly associated with higher CSS scores (higher use of coping strategies) at post-intervention than the ACT intervention (i.e. a significant negative *a* path to the CSS-total mediator) and higher CSS scores were required to be more strongly associated with abstinent outcomes in the CBST intervention than in the ACT intervention when controlling for the effect of intervention (i.e. a significant *b* path from the CSS-total mediator to smoking status).

Second, post-intervention AIS total score was predicted to be a stronger mediator of ACT outcomes than of CBST outcomes. For this effect to occur, the ACT intervention was required to be more strongly associated with lower AIS total scores than the CBST intervention (i.e. a significant *a* path to the AIS-total mediator) and lower AIS total scores were required to be more strongly associated with abstinent outcomes in the ACT intervention than in the CBST intervention when controlling for the effect of intervention (i.e. a significant *b* path from the AIS-total mediator to smoking status).

11.8.4. Mediation of Prolonged Abstinence Outcomes

Contrary to hypotheses, prolonged abstinence outcomes were not statistically mediated by reduced avoidance responding to smoking cues following ACT or by increased use of coping skills following CBST. Both the total effect (*c* β = 0.10, SE = 0.74, p = 0.893) and the direct effect (*c'* β = -1.62, SE = 1.47, p = 0.270) of intervention on prolonged abstinence status was non-significant. The total indirect effect, which reflects the difference between the total effect and the direct effect (*c – c'*), was non-significant (estimate = 0.44, BCa CI95 = -3.36 to 4.06). Though the path from intervention to prolonged abstinence status was significant (*a* β = -13.35, SE = 1.62, p < 0.001), the path from AIS-total mediator to prolonged abstinence status controlling for intervention was non-significant (*b* β = 0.10, SE = 0.08, p = 0.198), as was the indirect effect of intervention on prolonged abstinence status through the AIS-total mediator (*a*b* estimate = 1.73, BCa CI95 = -3.52 to 3.78). Likewise, though the path from intervention to the CSS-total mediator was significant (*a* β = -0.19, SE = 0.08, p = 0.009), the path from the CSS-total mediator to prolonged abstinence status controlling for intervention was non-significant (*b* β = 1.22, SE = 1.46, p = 0.403), as was the

indirect effect of intervention on prolonged abstinence status through the CSS-total mediator (*a*b* estimate = 0.29, BCa CI95 = -0.68 to 2.24). Finally, the contrast between the indirect effects through AIS-total and CSS-total was non-significant (estimate = -1.06, BCa CI95 = -3.82 to 4.00).

11.8.5. Mediation of 30-day Point Prevalence Abstinence Outcomes

Bootstrap mediation results for 30-day abstinence outcomes at six month follow-up, based on 10,000 resamples of the data, are summarised in table 8. Consistent with hypothesis, reduced avoidance of internal smoking cues at post-intervention fully mediated ACT's efficacy for producing 30-day abstinence at six month follow-up. The total effect of intervention on 30-day abstinence was non-significant (*c* β = 0.45, SE = 0.63, p = 0.475), as was the direct effect (*c'* β = -1.62, SE = 1.33, p = 0.223). The total indirect effect was also non-significant (*ab* estimate = 2.00, BCa CI95: -0.06 to 4.07). However, the paths from intervention to the AIS-total mediator (*a* β = -13.28, SE = 1.67, p < 0.001) and from the AIS-total mediator to the 30-day abstinence outcome controlling for intervention (*b* β = -0.17, SE = 0.08, p = 0.018) were both significant. Accordingly, the specific indirect effect of intervention on 30-day abstinence through the AIS-total mediator was significant (*ab* estimate = 2.48, SE = 2.20, BCa CI95 = 0.40 to 4.51)

In contrast, increased performance of coping skills at post-intervention did not mediate the efficacy of CBST for 30-day abstinence at six month follow-up as predicted. Though the path from intervention to the CSS-total mediator was significant (β = -0.21, SE = 0.08, p = 0.001), the path from the CSS-total mediator to the 30-day abstinence outcome was

non-significant (β = 2.25, SE = 1.45, p = 0.121), and accordingly, the indirect effect of intervention on the 30-day abstinence outcome through the CSS-total mediator was non-significant (estimate = -0.47, BCa CI95 = -1.29 to 0.20).

Finally, the contrast between the indirect effects transmitted through AIS-total and CSS-total mediators indicated that the specific indirect through the AIS-total mediator was significantly larger than the specific indirect effect through the CSS-total mediator (estimate = 2.95, BCa CI95 = 0.59 to 5.18). This contrast suggests that avoidance of smoking cues was a significantly stronger mediator of ACT outcomes than use of coping skills was as a mediator of CBST outcomes.

TABLE 8. UNSTANDARDISED REGRESSION PATH COEFFICIENTS, BOOTSTRAPPED POINT ESTIMATES, AND BIAS-CORRECTED AND ACCELERATED (BCAS) CONFIDENCE BOUNDS FOR THE INDIRECT EFFECTS OF INTERVENTION ON THE 30-DAY ABSTINENCE OUTCOME AT SIX MONTHS FOLLOW-UP.

		Path					95% CB for *ab* effect	
Model	Mediator	*a*	*b*	*c*	*c'*	*ab*	Lower	Upper
1				0.45	-1.62	2.00	-0.06	4.07
	AIS-total	-13.28***	-0.19**			2.48	0.41	4.45
	CSS-total	-0.21**	2.26			-0.47	-1.29	0.20
	Contrast					2.94	0.59	5.18
2				1.26**	-1.84	3.00	-0.53	4.78
	AIS-Thoughts	-3.98***	-0.14			0.56	-3.14	2.65
	AIS-Feelings	-5.35***	-0.28			1.48	-1.58	4.53
	AIS-Cravings	-4.18***	-0.23			0.95	-1.50	3.01

	Contrast[a]					-0.92	-7.34	3.08
	Contrast[b]					-0.39	-4.74	3.67
	Contrast[c]					0.53	-3.81	4.76
3				1.15**	1.00	0.27	-0.44	1.09
	CSS-Avoid	-0.19**	-2.11			0.58	-0.24	1.59
	CSS-Active	-0.23**	0.98			-0.32	-1.16	0.62
	Contrast					0.90	-0.78	2.56
4				1.16	1.00	0.18	-0.44	1.10
	CSS-Cog.	-0.19*	-2.11			0.59	-0.24	1.59
	CSS-Beh.	-0.23**	0.98			-0.32	-1.16	0.62
	Contrast					0.90	-0.78	2.26
5				1.18	0.91	0.43	-0.29	1.26
	CSS-Prob.	-0.23**	-0.75			0.27	-0.59	1.24
	CSS-Emo.	-0.21*	-0.56			0.16	-0.46	0.99
	Contrast					0.11	-1.37	1.52

Note: AIS = Avoidance and Inflexibility Scale; CSS = Coping Strategies Scale; CB = Bias corrected and accelerated (BCa) confidence bounds around the *ab* mediated effect. The *ab* mediated effect is significant at $p < 0.05$ if the CB does not contain zero;

[a] AIS-thoughts vs. AIS-feelings; [b] AIS-thoughts vs. AIS-cravings; [c] AIS-feelings vs. AIS-cravings.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.01$.

11.5.1.1. EXPLORATORY MEDIATION ANALYSIS OF AIS SUBSCALES

Follow-up analyses were conducted to check whether ACT's effectiveness for 30-day abstinence was more strongly mediated by decreases in avoidance of specific types of internal smoking cue (thoughts, feelings, and cravings) than by a decrease in avoidance of all three types of cues together. The specific indirect effects of the three subscales of the AIS were tested and contrasted within a multiple mediator model. Bootstrap results (10,000

resamples) showed that the total indirect effect was non-significant (estimate = 4.72, BCa CI95 = -0.53 to 4.78). Despite significant *a* paths (intervention to AIS subscales) indicating that ACT reduced avoidance of each type of cue at post-intervention compared to CBST, the specific indirect effects of intervention through the AIS-thoughts (estimate = 0.56, BCa CI95 = -3.14 to 2.65), AIS-feelings (estimate = 1.48, BCa CI95 = -1.58 to 4.53) and AIS-sensations mediators (estimate = 0.95, BCa CI95 = -1.50 to 3.01) were non-significant. No contrasts were significant.

11.5.1.2. EXPLORATORY MEDIATION ANALYSES OF CSS SUBSCALES

The finding that CSS-total did not fully mediate the effect of intervention on the 30-day abstinence outcome did not rule out the possibility that the avoidant, active, cognitive, behavioural, problem-focused, and emotion-focused dimension of the CSS may better mediate this relationship. The specific indirect effects of intervention on the 30-day abstinence outcome at six month follow-up through the avoidant-acceptant dimensions and through the problem-focused-emotion-focused dimensions of the CSS were tested and contrasted within separate multiple mediator models, with baseline scores on these subscales entered as covariates.

11.5.1.2.1. AVOIDANT-ACTIVE MODEL

Bootstrap results (10,000 resamples) indicated a non-significant total indirect effect (estimate = 0.27, BCa CI95 = -0.44 to 1.10). The specific indirect effects of intervention

through the CSS-active (estimate = 0.58, BCa CI95 = -0.24 to 1.59) and CSS-avoidant mediators (estimate = -0.23, BCa CI95 = -1.16 to 0.62) were non-significant. The contrast between the indirect effects through the CSS-active and CSS-avoidant mediators was non-significant (estimate = 0.64, BCa CI95 = -0.78 to 2.56).

11.5.1.2.2. PROBLEM-FOCUSED-EMOTION-FOCUSED MODEL

The total indirect effect was non-significant (estimate = 0.43, BCa CI95 = -0.29 to 1.26), as were the specific indirect effects of intervention through the CSS-problem-focused (estimate = 0.27, BCa CI95 = -0.59 to 1.24) and CSS-emotion-focused mediators (estimate = 0.16, BCa CI95 = -0.46 to 0.99) were non-significant. Finally, the contrast between the indirect effects through the CSS-problem-focused and CSS-emotion-focused mediators was non-significant (estimate = 0.06, BCa CI95 = -1.37 to 1.52).

CHAPTER TWELVE: SUMMARY OF STUDY FINDINGS

12.1. MAIN FINDINGS

The present study compared the relative efficacy of a well-established cognitive-behavioural coping skills training (CBST) intervention and Acceptance and Commitment Therapy (ACT) for producing long-term smoking abstinence in a community sample of motivated-to-quit nicotine-dependent smokers, and examined mediation of smoking

outcomes by these interventions' putative mechanisms of action. Results of an efficacy analysis showed that ACT participants had 3.47 times higher odds of no smoking in the 30 days prior to a six month follow-up assessment, an effect which was statistically significant at the 94% confidence level. ACT participants remained more than thrice as likely to have 30-day abstinence at six month follow-up in an intent-to-treat analysis (i.e. when missing data were converted to 'still smoking'), though the effect size was no longer statistically significant at $p < 0.06$.

The observed 39% 30-day abstinence rate among ACT participants at six month follow-up was more than twice the 16.2% weighted average of the 30-day abstinence rate associated with practical counselling (i.e. problem-solving/coping skills training) interventions for smoking cessation at six month follow-up (Fiore et al., 2000), and also improved upon on the 24.7% and 28.4% weighted averages of 30-day abstinence rates associated with the most effective number of person-to-person counselling sessions (eight+ sessions) and the most effective total amount of contact time (1.5 to 4 hours), respectively. The observed 15% 30-day abstinence rate associated with CBST at six month follow-up was equivalent to the 16.2% weighted average abstinence rate for practical counselling. This suggested that the present CBST intervention, which retained the core processes of established intensive CBST programmes for substance use problems in its briefer format, produced six month abstinence on a par with higher intensity counselling interventions. This conclusion is made only tentatively though given that the abstinence rates being compared were derived through very different analytical techniques.

The effect size for ACT's efficacy for 30-day abstinence strengthened considerably between the three month and six month follow-up (from an OR of 1.24 to 3.47). A similar effect of time was found by Gifford et al. (2004) and Hernandez-Lopez et al. (2010). For

example, the intent-to-treat analysis in the latter study showed the adjusted effect size (odds ratio) for ACT versus CBT for 30-day abstinence increased from 2.44 (p = 0.16) at post-treatment to 2.51 (p = 0.18) at six month follow-up to 5.13 (p = 0.02) at twelve month follow-up (the farthest follow-up point). The present pattern of abstinence rates associated with CBST and ACT at each follow-up suggests that while both interventions had clear and comparable quitting benefits in the short-term (i.e. three months post-quit), the short-term benefits of CBST had largely subsided by the six month follow-up in contrast to the continued beneficial impact of ACT. This tailing off of CBST's therapeutic impact with time is consistent with, but not direct support for, ACT's suggestion that the intuitive nature of the avoidance coping strategies taught in CBST means they can be grasped fairly quickly and effectively to solve problems in the short-term, but not fail to support valued, experientially difficult behaviour change in the long-term. The acceptance, mindfulness and defusion skills that are taught in ACT, on the other hand, are typically initially counter-intuitive to most people and so may initially be trickier to grasp, meaning that their therapeutic effects will be powerful but may take longer to fully emerge. That is, the ACT model predicts that CBST's mechanisms of smoking behaviour change should be fast-acting but short-lasting whereas ACT's mechanisms of change should be slower-acting but longer-lasting. Put another way, the ACT model implicitly predicts that CBST's effectiveness for 30-day abstinence should be more strongly mediated by its putative mechanism of action in the earlier stages of a quit attempt than after a clinically significant period post-quit day (i.e. beyond six months) whereas mediation of ACT's effectiveness by its mechanisms of action may become stronger with time.

Essentially, efficacy analyses suggest that a therapy model which weakens the rationale for avoidance coping, fosters acceptance of all internal states, trains psychological

flexibility (i.e. cognitive defusion), and fosters commitment to valued action, delivered with high adherence to treatment manuals by a non-expert therapist over 4.5 hours of total contact time, may be at least as effective as CBST, the current gold standard in behavioural intervention for smoking cessation, for facilitating smoking abstinence up to six months post-quit. However a more powerful replication study is required to verify these preliminary efficacy data.

12.2. MEDIATION FINDINGS

Mediation findings implicate 'experiential avoidance' as an important determinant of who will relapse to smoking and who will remain abstinent up to six months after CBST and ACT, and suggest that ACT's techniques for reducing avoidance of internal smoking cues are stronger predictors of smoking abstinence than are CBST's techniques for increasing avoidance of internal smoking cues.

Avoidance of internal smoking cues fully mediated the effect of ACT on smoking outcomes in the manner specified by the ACT model. Specifically, ACT had reduced participants' avoidance responding to internal smoking cues by post-intervention compared to CBST, and lower levels of smoking cue avoidance at post-intervention increased ACT participants' odds of no smoking in the 30 days prior to the six month follow-up assessment. However, in exploring this mediation effect further, ACT abstinence outcomes were not more strongly mediated by decreases in avoidance of *specific* types of internal smoking cue (thoughts, feelings, and cravings) than by a decrease in *total* avoidance of internal smoking cues.

Evidence of strong mediation of ACT outcomes by a global reduction of avoidance and weak mediation of ACT outcomes by specific reductions of avoidance are consistent with a key goal of ACT: to provide a rationale for accepting all internal smoking cues while increasing awareness of signs that specific types of internal cue are being evaluated in terms of their acceptability, which would suggest that a participant was still buying into the literality of these evaluations and in turn, their inability to take effective action in their presence. Additionally, ACT participants used their difficult thoughts, emotions and physical sensations as content for mindfulness and defusion exercises to allow them to see that, with an appropriate contextual manipulation, these phenomena are equally 'defusable' from their verbal labels. It would have been highly unusual had ACT participants' significantly varied in their endorsement of the functional importance of reducing or eliminating one but not another type of internal smoking cue.

From a statistical perspective, Preacher and Hayes (2008) indirect method of testing statistical mediation revealed a very interesting interaction between the AIS-total and CSS-total mediators on the significance of the total indirect effect on ACT outcomes which has important consequences for the future of mediation testing. The significant indirect effect which was transmitted through the AIS-total mediator occurred in the absence of a significant total effect of intervention on 30-day abstinence. This mediation effect would not have been discovered had Baron and Kenny's (1986) advice to cease testing of indirect effects in the absence of a significant total effect been followed. According to Hayes (2009), statistically significant indirect effects which emerge in the absence of a significant total effect can be explained by the presence of two or more indirect paths in the model which each transmit an effect from X on Y but operate in opposite directions. A significant total effect (i.e. a significant association between intervention and outcome) is therefore not required to

proceed with tests of indirect effects through mediators. This is what was observed here: the indirect effect of intervention on the 30-day abstinence outcome through the CSS-total mediator, though not statistically significant, was sufficiently large in the negative direction to cancel out the significant indirect effect through the AIS-total mediator, which occurred in the positive direction, in the estimation of the total indirect effect to yield a non-significant total effect of intervention on the 30-day abstinence outcome; indeed, the total effect was very close to zero. Thus, the significant indirect effect through the AIS-total mediator in the absence of a significant total effect of intervention on the 30-day abstinence outcome indicated that ACT decreased participants' avoidance of internal smoking cues compared to CBST, which in turn significantly increased their odds of 30-day abstinence, and decreased their use of coping strategies compared to CBST, which only very slightly reduced their odds of abstinence.

In contrast, the mediation findings raise doubt that the techniques which increase smokers' use of avoidance-based coping strategies were the active ingredients accounting for CBST's success in producing long-term smoking abstinence. Contrary to hypothesis, performance of coping skills did not mediate the effect of CBST on smoking outcomes. Though CBST did increase participants' performance of coping skills compared to ACT, higher coping did not increase the likelihood of 30-day smoking abstinence at six month follow-up. That is, increased performance of coping skills was not important for smoking abstinence to occur following CBST.

Follow-up mediation analyses confirmed that CBST outcomes were not more strongly mediated by increases in *specific* types of coping skill than by an increase in *total* coping. Contrary to expectation, CBST yielded only small pre-post effect size increases in the use of avoidant coping skills and problem-focused coping skills, though neither of these specific

skill increases were significantly related to CBST outcomes. These mediation findings for CBST closely resemble those of eight of the nine studies of CBST for alcohol problems reviewed by Morgenstern and Longabaugh (2000). A final noteworthy comment about the role of coping skills in abstinence is that, consistent with ACT's focus on reducing all forms of avoidance, however, ACT produced small-moderate pre-post effect size reductions in the variables that were intended to mediate CBST's effectiveness – performance of avoidant, active, problem-focussed, emotion-focussed, and total coping skills at post-intervention. However, as noted above, lower use of coping skills at post-intervention was not significantly related to ACT outcomes.

Finally, a contrast of the relative contribution of the AIS-total and CSS-total mediators to the success of their relevant interventions showed that techniques which reduced avoidance responding made a significantly larger contribution to the therapeutic impact of ACT than did the techniques which increased performance of coping skills made to the therapeutic impact of CBST. Overall, mediation findings suggest that the techniques which targeted a reduction of participants' avoidance responding to internal smoking cues were the active ingredients accounting for ACT's efficacy for past 30-day smoking abstinence at six-month follow-up. In contrast, the source of CBST's efficacy in the present study is not known; techniques which increased performance of coping skills had little bearing on whether CBST participants would smoke in the 30 days prior to their six month follow-up.

12.3. EXPLAINING THE LACK OF MEDIATION OF CBST OUTCOMES

The failure of coping skill use at post-intervention to mediate CBST smoking outcomes can be explained in several ways. First, perhaps simply increasing the use of a range of coping skills will not facilitate smoking cessation if the wrong skills or skills irrelevant to the person and the problem are being used. For example, participants' self-monitoring records of internal and external triggers they had experienced between the first and second CBST meeting were used to tailor the teaching of skills that were most relevant to these participants' daily lives. However, cognitive-behavioural interventions' typical reliance on retrospective self-report data and lack of supporting prospective data has been criticised on the basis that even if smokers accurately recall the sequence of events which led to a slip or relapse, there is no way to confirm whether the reported antecedents were in fact causal determinants of the slip or relapse. It is thought that reported antecedents likely interact synergistically with one another and with unreported antecedents which long predate the slips or relapse, to cause the slip or relapse (Bromet & Moos, 1979). Therefore, participants' self-monitoring records may have misled as to true causal factors in smoking episodes and therefore have caused the therapist to overlook the most appropriate strategies.

Additionally, it is possible that a focus on teaching participants to learn and use types of coping skills to solve specific smoking problems came at the expense of teaching coping skills which were transferable across several life domains. For example, the social skills training component of CBST focused predominantly on solving social problems which involved smoking; perhaps if the focus of the social skills components is broadened to include learning of more general social skills for coping with life's demands, failures in coping may be less likely to lead to unhappiness and in turn to smoking as a way to increase pleasant feelings. CBST's effectiveness may also be strengthened by incorporating elements which increase participants' motivation and self-efficacy for using skills once they have been

learned. Motivational interviewing, for example – a strategy aimed at increasing a client's motivation for change – has been shown to increase the effectiveness of other treatments for alcohol problems (Brown & Miller, 1993). While CBST started in the present study with the prototypical assumption that participants were already sufficiently motivated to change – they volunteered for the study despite no financial incentive – and needed only to acquire the skills necessary to do so, this may not have been the case and with hindsight, it is possible that in some cases, skills were acquired but participants had little motivation to use them. Incorporating motivational interviewing into CBST may therefore increase motivation to use coping skills once they have been acquired.

This possible interdependence of skill performance with other treatment elements opens up a second possibility: perhaps use of coping skills at post-intervention only mediates smoking outcomes when moderated by participants' use of coping skills at intake. Specifically, perhaps coping skills training mediates the outcomes of participants' who have the greatest skills deficits at intake, lowest motivation for using skills, and lowest self-efficacy for using skills, but not the outcomes of participants who are quite high on these variables at intake. Kadden, Litt, Cooney and Busher (1992) report findings that are consistent with this putative moderated mediation effect in the context of alcohol treatment: alcoholics who were rated at intake as having poorer role-playing skills or higher anxiety had better drinking outcomes if treated in the groups which trained role-playing skills and skills for reducing anxiety. Evidence that low coping at intake moderates the likelihood that coping skills training will result in positive smoking outcomes would position low coping at intake as a potentially useful criterion for treatment-client matching. Detecting any moderation of a mediated effect of the use of coping skills on CBST outcomes, however, would require considerably more statistical power than was afforded by the present design.

A third explanation is that CBST outcomes are more strongly mediated by participants' competence for using skills, which was not assessed, than by their mere frequency of use. Inclusion of a coping competency measure in future CBST studies will help clarify the relative importance of smokers' competence and frequency of total and specific skill use in determining CBST outcomes. If coping competency was an important untapped mediator in the present study, then it is also possible that delivering CBST over 4.5 hours was both too brief to sufficiently increase participants' use of coping skills – CBST participants showed only small pre-post effect size increases on CSS dimensions – and too brief for them to become sufficiently competent at using these skills. The rationale for scheduling the present CBST and ACT interventions over three 90-minute meetings is described in a later section. Future research should consider the optimal total contact time with CBST participants for activating these and other CBST-specific mechanisms of change.

A final possible explanation is simply that the present mediation findings are valid; increasing use of coping skills is neither necessary nor important for quitting smoking. Perhaps, as is the grounds for ACT, learning and performing coping skills impedes more than enables people to stop smoking, and perhaps learning experiential acceptance-based skills would have better served CBST participants' valued goals. It may also be the case that simply engaging in any treatment at a critical period, with like-minded peers in a supportive, non-judgmental environment, more strongly predicts the therapeutic impact of CBST than does any CBST-specific technique. Examining mediation of future CBST outcomes by non-specific therapy factors, such as intra-group peer support and therapist-client alliance, would help clarify the relative mediational role of putative CBST-specific and non-specific therapy factors in CBST outcomes.

12.4. No Moderation of Smoking Outcomes by Paradoxical Tendency

The present study was the first to develop experimental measures of smokers' paradoxical behaviour under avoidance instruction for the specific purpose of examining the relationship between smokers' paradoxical performances on these experimental measures and their smoking outcomes following avoidance coping-focussed CBST. Mirroring findings reported by Russell and Grealy (2010), paradoxical and overcompensatory effects of avoidance instructions were not experienced uniformly by participants on the motor control task; rather, significant inter-individual differences in performance type were observed within the 'no load' condition. The number of participants who showed consistent overcompensatory and paradoxical performance on this task varied as a function of cognitive load, with overcompensatory performers only significantly more numerous than paradoxical performers under conditions of no cognitive load. Similar individual differences emerged on the motion timing task. Cognitive load again had a significant effect on the nature of participants' timing errors; overcompensatory performance (i.e. consistently stopping early when instructed to avoid stopping late *and* consistently stopping late when instructed to avoid stopping early) was significantly more likely than neutral and inconsistent performance in the 'no load' condition only.

By contrast, the vast majority of participants showed no significant paradoxical or overcompensatory processing bias in either load condition of the visual search or recognition memory task. Two competing explanations are proposed for the extreme heterogeneity of performance shown on these two tasks: the task designs and classification procedures were insufficiently sensitive to detect important individual differences in processing tendency, or, the task designs and classification procedures were sufficiently sensitive to detect differences,

but participants were not susceptible/well able to avert paradoxical and overcompensatory errors on these tasks. Given that significant individual differences in paradoxical and overcompensatory behaviour were found on the motor control and motion timing tasks, which employed extremely similar task designs and data analysis procedures, the latter explanation is thought to be the more likely.

Nonetheless, the significant inter-individual differences in paradoxical tendency which emerged on the motor control and motion timing tasks were used to hypothesise that there may also be important differences in smokers' abilities to acquire and perform the avoidance coping skills that were taught in the CBST intervention, and that participants' task performances may predict the therapeutic benefit of CBST.

However, this latter hypothesis was not supported; paradoxical errors made on the motor control and motion timing tasks were not important determinants of the therapeutic benefit of CBST. The most obvious explanation for this null moderation effect is that the paradoxical errors shown on the experimental tasks are valid but do not generalise beyond those contexts. That is, these effects are context-dependent rather than evidence of a stable, trait-like instruction processing bias. An alternative explanation, however, is that a paradoxical processing tendency may in fact influence the success of CBST, but that a paradoxical tendency *measured in these ways* does not influence the success of CBST. Future research may wish to assess the predictive power of measures of smoking-specific behavioural avoidance skills for CBST's efficacy rather than or in addition to other measures of general perceptuo-motor skill. For example, response inhibition on an anti-saccade task (which requires participants to inhibit their gaze towards a particular stimulus on command) has been shown to be worsened by even overnight smoking abstinence (Powell, Dawkins, & Davis, 2002), improved by nicotine administration (Powell, Pickering, Dawkins, West et al.,

2004), and predictive of long-term smoking outcome (Pettiford, Kozink, Lutz, Kollins et al., 2007). Therefore, it was presumed that participants in the present study would be best able to suppress thoughts and inhibit movements prior to beginning their quit attempt (i.e. during regular smoking), not confounded by the loss of attentional resources or inhibitory dysregulation that is typically caused by smoking abstinence. It would be interesting to now compare smokers' inhibitory functioning during regular smoking with that during maintained abstinence in order to assess the hypothesised relationship between response inhibition in experimental contexts and inhibition of smoking behaviour.

A final possible explanation is that because participants' performance of coping skills at post-intervention did not mediate CBST outcomes, as was predicted, paradoxical tendency did not have sufficient power to moderate the effect of this presumed mediator on CBST outcomes. That is, paradoxical tendency was predicted to moderate the use of coping skills only because use of coping skills was presumed to be the active ingredient of CBST. Without knowledge of the active ingredients of CBST, the role of paradoxical tendency in determining CBST outcomes cannot be fully gauged. In any event, the four experimental tasks developed for this study proved useful for revealing significant individual differences on basic perceptuo-motor tasks, but little use as a prognostic tool for CBST's efficacy for smoking cessation.

CHAPTER THIRTEEN: GENERAL DISCUSSION

13.1. STRENGTHS OF THE STUDY DESIGN

Though it was not possible to procure the funding necessary to mount a large and intensive comparative effectiveness study, strengths of the design of the intervention phase of this study were its foci on increasing the theoretical quality, fidelity of implementation, and methodological stringency of the two interventions in several ways which costed little or no money. Incorporating these design features increases the likelihood that psychological interventions will fulfil the criteria of an empirically-supported treatment for increasing a targeted health behaviour, provided that effectiveness in demonstrated (Campbell, Fitzpatrick, Haines, Kinmonth et al., 2000; Bellg, Borrelli, Resnick, Hecht et al., 2004; Ost, 2008; Craig, Dieppe, Macintyre, Michie et al., 2008; Michie & Prestwich, 2010).

13.1.1. Intervention Development was Theory-Based

Using theory to guide intervention development can inform investigators' understanding of why interventions are effective or ineffective for changing health behaviours and of the mechanisms which mediate these changes. This knowledge can guide the development of intervention techniques and technique bundles which should, theoretically, more effectively target the crucial mechanisms of change. Yet, despite the apparent advantages of using theory to systematically develop interventions, several reviews have found that few health behaviour change interventions made explicit reference to a guiding theory, let alone applied or tested a theoretical prediction (Albaraccin, Gillette, Earl, Glasman et al., 2005; Trifilett, Gielen, Sleet & Hopkins, 2005). A behaviour change intervention unguided by theory limits the potential effectiveness of these interventions, limits evaluation of these interventions' mechanisms of action and, in turn, limits the potential for generalising effective interventions and avoiding generalising ineffective

interventions. Second, when interventions do have a coherent theoretical basis, they rarely describe how the theory informed the intervention design, define how their intervention techniques were linked to theoretical mechanisms/predictors of behaviour change, or make the case for the independence of targeted mechanisms or parsimony of their bundle of intervention techniques. Third, when investigators conclude that their findings demonstrate the effectiveness of a theory for designing interventions, they rarely describe how the theory should be refined or developed in light of their findings to inform future intervention development (Michie, Sheeran, & Rothman, 2007).

A main aim in the present study was to address these three typical shortcomings of health behaviour change interventions. The intervention phase of the study was designed in such a way that we could evaluate the extent to which changes in participants' smoking behaviour were explained by the theories which guided the development of the two interventions. This was achieved by identifying two theory-based behaviour change interventions which specify contrasting mechanisms for changing smoking behaviour in nicotine-dependent individuals and suggest techniques for operationalising and manipulating these putative mechanisms of change, and by explicitly linking intervention techniques to these theory-based mechanisms.

13.1.2. High Fidelity of Implementation

Despite clinical recommendations and an increasing number of tools and procedures for measuring and implementing fidelity, there continues to be little evidence that treatment fidelity is routinely conducted in clinical trials. Poor adherence to specified treatment

protocols makes it impossible for investigators to draw conclusions about a treatment's effectiveness or to replicate a study (Bellg et al., 2004). For example, if significant treatment effects are found but fidelity was not monitored or optimised, the investigators cannot confidently conclude that observed behaviour changes were due to the prescribed treatment content and not to content which may have been added or omitted to the prescribed content (Cook & Campbell, 1979). On the other hand, if non-significant results emerge and treatment fidelity was poor, investigators cannot know whether the non-significant treatment effects was due to high adherence to ineffective treatment protocols or to low adherence to effective treatment protocols. Therefore, because high treatment fidelity is not necessarily associated with better treatment outcomes, a high degree of adherence to specified treatment protocols is the best test of a well conceptualised intervention and can protect against prematurely discarding potentially effective treatments and generalising ineffective treatments at a high cost to patients and services.

Monitoring treatment fidelity is also important because reviews have found that those charged with delivering an intervention tend to make substantial modifications to the prescribed content and procedures for delivery. For example, Borrelli, Sepinwall, Ernst, Bellg et al. (2005) found that, of 342 health behaviour change outcome studies published in five journals between 1990 and 2000, only 27% assessed whether the intervention was delivered as specified. More recently, Hardeman, Michie, Fanshawe, Prevost, et al. (2008) assessed the adherence of four facilitators to 208 protocol-specified facilitator behaviours using 108 session transcripts of an intervention to physical activity in sedentary adults. Facilitators showed only modest adherence to the specified behaviours (median = 44%) and adherence decreased by an average of 9% per session across the four sessions of the intervention.

The present study design incorporated Bellg et al.'s (2004) recommendations for monitoring and assessing the fidelity of treatment to specified protocols. In order to provide the best test of CBST and ACT's efficacy for smoking cessation, two independent raters assessed a 20% random sample of meetings for therapist adherence to the intervention manuals (checking for both errors of omission (adding unspecified components) and commission (deleting specified components)), the discriminability of CBST and ACT meetings, and non-specific therapist factors (e.g. empathy, interactional style) using a validated adherence measure. Additionally, participants' enactment of taught skills between meetings was checked by the therapist at each meeting. Results suggest that both interventions were highly discriminable and implemented with high fidelity and competence, which increases confidence that smoking outcomes were due to the therapist's delivery and participants' enactment of the CBST and ACT techniques specified in their respective protocols.

13.1.3. Increased Methodological Rigour

A comparative review of 13 ACT trials and 13 matched CBT trials published in the same journal within the same or ±1 year found that ACT trials had been conducted with a research methodology that was significantly less stringent than that used in CBT trials (Ost, 2008). Specifically, ACT trials were significantly less likely to have: ensured that active treatments under comparison comprised an equal number of therapy hours; ensure that the active treatments under comparison were delivered by the same number of therapists; used established outcome measures; monitored therapist adherence to specified treatment protocols; controlled for the effect of treatment attrition by reporting results of intent-to-treat

analyses; controlled for participants' use of concomitant treatments. Testing the efficacy of a novel psychological intervention within a design which offers less control of possible confounders and uses more liberal measures of success than the designs within which established interventions were tested can lead to a grossly inflated sense of effectiveness for the novel treatment. Concluding that no ACT study included in this review was methodologically 'good' enough to fulfil the first criterion for an empirically supported psychological intervention (Chambless & Hollon, 1998), Ost points future investigative teams toward fifteen methodological improvements which, providing that efficacy is demonstrated, will increase ACT's chances of meeting criteria for empirical status.

The present study design incorporated the majority of Ost's (2008) recommendations for trials evaluating ACT, Hughes et al.'s (2003) recommendations for trials evaluating an aid-to-smoking cessation treatments, and the Medical Research Council's framework for designing and evaluating complex interventions (Campbell et al., 2000; Craig et al., 2008). Specifically, we aimed to recruit a heterogeneous sample of motivated-to-quit smokers from the community; no financial incentive was offered for participation; participants were randomised to an intervention; both interventions were delivered to groups; both interventions were delivered by the same student therapist with minimal-moderate experience rather than several highly trained therapists with specific expertise so as to more closely reflect the actual frontline delivery of treatment in clinical and community settings; clinically significant measures of smoking outcome were used; and mediation analyses examined the extent to which smoking outcomes were accounted for by changes in each intervention's theoretically-relevant active ingredients; and results are reported for intent-to-treat analyses in which missing data were converted to 'still smoking'.

13.1.4. Interventions Were Delivered in a Group Format

Though the evidence does not strongly favour a group versus individual format (Stead and Lancaster, 2009), several studies suggest that, from the point of the person who is motivated to quit, it is probably worth joining a group for the benefits of multiple sources of feedback, social learning and peer reinforcement for quitting (Monti et al., 1989; Fiore et al., 2000; West, McNeil & Raw, 2000; Stead & Lancaster, 2009). The decreased time and resource demands associated with the group versus individual format also make group therapy a significantly less expensive option. Though no cost data were recorded, the fact that both interventions achieved relatively high abstinence rates in a group format (i.e. reaching more people) over a relatively short total contact time makes both interventions attractive as comparatively cost-effective treatment options to more intensive and person-to-person treatment. That is, the present interventions would have a higher likelihood of acceptance as cost-effective at lower monetary thresholds of funders' willingness to pay to gain one abstinent smoker.

With a view to replicating the these interventions however, decision makers should weigh these potential benefits of the group format against its limitations, including a limited appeal to the general population, the reluctance of individuals to be treated as part of a group due to fears of being stigmatised and blamed, reluctance to compare one's own progress to the progress of peers, reluctance to share the therapist's time, the logistical difficulty and labour intensity for therapists to negotiate session times for a minimum number of people, and a reliance upon a minimum number of people turning up for each session. Stead and Lancaster (2009) found that participation rates in group smoking cessation programmes were generally lower than in individual and pharmacological treatment programmes which

suggests that participants of group programmes not only need to be sufficiently motivated to sign up but to then commit time and effort to attending group sessions. Nonetheless, Stead and Lancaster (2009) recommend that behavioural interventions for smoking cessation should be conducted in groups when feasible to do so.

13.2. FUTURE DESIGN CONSIDERATIONS

13.2.1. THERAPIST EXPERIENCE

The use of minimally-experienced therapists in ACT studies is common. Forman Herbert, Moitra, Yeomans & Geller (2007), for example, showed that 23 doctoral psychology students with no training in ACT and little training in CBT for anxiety and depression could be trained to be adherent to the ACT and cognitive therapy models, even in the absence of distinct treatment manuals, and that highly trained clinicians could quite readily disseminate these treatment models to therapists-in-training. Therapists in Hayes et al.'s (2004) comparison of methadone maintenance alone versus methadone maintenance in combination with either ACT or intensive twelve-step facilitation (ITSF) were also four students trained to Masters level or higher in clinical psychology with at least two years' experience in delivery of behavioural therapy for substance use problems. Finally, Steve Hayes, the co-creator of ACT, expressed in a personal communication to the author that adherence to protocols, not professional accreditation, should determine the reliability of conclusions about a treatment's efficacy: "I would not worry about accreditation… ACT folks are cautious about that entanglement and hierarchy anyway. I'd just worry about getting the protocol in good shape

and delivering it with good care (good adherence etc.)". Indeed, the specified protocols were independently considered to have been delivered with high adherence and competence.

13.2.2. Therapy Duration

CBST and ACT were delivered over three 90-minute meetings (4.5 hours total contact time) for three reasons. First, while the primary goal was to establish each intervention's efficacy for producing smoking abstinence, delivering interventions across fewer meetings should, in theory, improve clarity about the mechanisms underpinning smoking behaviour change in each intervention. Second, a feasibility study which preceded the present study found that most treatment-seeking smokers would be willing to commit to a treatment program which involved three, consecutive weekly, two-hour meetings, but considered that two meetings were 'not enough to make any real change' and four meetings were 'too much time to commit to'. Compressing treatment into fewer sessions of longer duration was deemed to be in line with Stead and Lancaster's (2009) recommendation that smokers ideally be offered around five weekly evening sessions lasting 60 minutes over four weeks, but that smokers should be offered less intense interventions which retain the core components of a more intensive intervention when they are unable or unwilling to commit to more intense interventions. Third, the most comprehensive review of ACT trials to date (Ruiz, 2010) found that many ACT interventions have produced clinically significant cognitive and behaviour change in their clientele after five or fewer sessions, where sessions were 60 minutes or shorter. For these three reasons, delivering 4.5 hours of CBST and ACT over three meetings was deemed an appropriate and sufficient number of sessions and total contact time to allow significant smoking behaviour change to occur in ways that were predicted by each model.

13.2.3. Statistical Power

The effect size for ACT for 30-day abstinence at six month follow-up was relatively large but not statistically significant at the conventional 95% confidence level. This may have been due to the low cell size in the efficacy sample. Given an odds ratio of 3.23 and a sample of 57, a two-sided logistic regression (p = 0.05) has only 55% power to detect a significant difference between interventions. With the present efficacy sample at the six-month follow-up (CBST = 26, ACT = 31), a logistic regression equation with 11 predictor variables had 80% power (Cohen, 1988) at p = 0.05 (two-tailed) to detect a difference of 18.18% versus 72.22% in abstinence rates (unadjusted OR = 3.97). Based on the weighted odds ratios associated with behavioural interventions compared to no treatment in recent meta-analyses (Mottillo, Filion, Belisle et al., 2009; Hajek et al., 2009), a four-fold difference in the number of abstinence outcomes between active behavioural interventions was not likely, which suggested the efficacy analysis may have been underpowered to detect a statistically significant effect of intervention at $p < 0.05$. On the other hand, two recent treatment trials, conducted by independent investigative teams, found that ACT produced four times as many quitters at 12-month follow up as NRT (adjusted OR = 4.2, N = 55, Gifford et al., 2004) and CBT (unadjusted OR = 4.46, N = 56, Hernandez-Lopez et al., 2010) in smaller samples, and in addition, the statistical superiority of ACT over ESTs has been demonstrated in many studies (see Hayes, Luoma, Bond et al. (2006) and Ruiz (2010) for reviews) in sample sizes that were smaller than the size of the present efficacy sample at six-month follow-up (n = 57).

The *Division 12 Task Force on Psychological Interventions* (Chambless & Hollon, 1998) also recommends that one's power to detect statistically significant differences

between two psychological interventions be estimated by making reference to accepted norms for evaluating psychological treatment effects. To achieve the conventional 80% power to detect a medium-sized difference (d = 0.50) between two treatment groups, an investigator requires approximately 50 participants per group. However, recruiting a sample of 100 to a psychological intervention trial is "a very expensive proposition indeed" (Chambless & Hollon, 1998: 10) given that the median number of participants per condition in psychological treatment outcomes studies is twelve (Kazdin & Bass, 1989). The APA Task Force therefore conclude that if "in an otherwise sound study, (a) investigators have a sample size of 25 to 30 per condition (thus allowing a reasonably stable estimate of the effects of treatment), (b) the unproven treatment is not significantly inferior to the established efficacious treatment on tests of significance, and (c) the pattern of the data indicates no trends for the established efficacious treatment to be superior, the treatments may be considered equivalent in efficacy in this study" (Chambless & Hollon, 1998: 10). On this normative basis, sample sizes of 26 and 31 in the CBST and ACT conditions respectively at six-month follow-up (the lowest group Ns across the three follow-up assessments) were considered sufficiently large to draw conclusions about the statistical equivalence of ACT and CBST efficacy for smoking abstinence.

On a broader note, Cohen (1990) argues that an observed difference for which $p >$ 0.05 should not be discarded as clinically meaningless solely on the basis of dichotomous statistical decision-making because ".05 is not a cliff but a convenient reference point along the possibility-probability continuum. There is no ontological basis for dichotomous decision making in psychological inquiry" (p.1311). Wagenmakers (2007) goes as far as to argue that p values which approach 0.05 in small samples may have similar or greater evidential value than p values that are slightly lower 0.05 in large samples. Additionally,

health behaviour change research in the past 20 years has increasingly adopted Cohen's argument that *p* values should be invoked as a more or less helpful descriptor of more informative effect sizes when inferring the clinical significance of an intervention. Taking these statistical arguments into account, it was considered that the large magnitude of effect size for ACT on the 30-day abstinence outcome at six month follow-up in this modest sample warrants the conclusion that the difference in rates of abstinence produced by ACT and CBST would likely represent a clinically significant public health impact of providing brief ACT to quitting smokers.

One final note regarding sample size is that recruitment to this study may have been affected by the launch of another free smoking cessation programme taking place at the university (run by the occupational health department) roughly two months after recruiting for the present study had begun. This alternative programme offered volunteers their "choice of NRT and six X one-hour group meetings (with 20-25 participants) for six weeks with a smoking cessation counsellor". The effect of this alternative programme running concurrently with the present study for a period on recruitment efforts is not known.

13.2.4. Reliance on Self-Reported Smoking Data

Due to financial and personnel constraints, it was not possible conduct cotinine or biochemical verification checks of participants' self-reported smoking outcome data in this study. However, a meta-analysis of 26 RCTs (N = 36,830: Patrick, Cheadle, Thomson et al., 1994) containing 51 comparisons of self-reported smoking with results of biochemical verification found generally high levels of specificity (89%) and sensitivity (87%) for self-

reported data across all studies, indicating the general accuracy of self-reported smoking status. However, it is recommended that future studies biochemically verify self-reported smoking data when feasible to do so.

13.3. THE FUTURE OF CBST AND ACT FOR SMOKING CESSATION: IS COHERENT INTEGRATION POSSIBLE?

Data on the efficacy of ACT for changing smoking behaviour are as yet too sparse and preliminary to say whether ACT is an inferior, equivalent, or superior alternative behavioural treatment to CBST. More importantly, the success of one brand of psychotherapy does not come at the expense of another brand; ACT and CBST are not in competition or hostile to one another, and ACT "is not directly buoyed by whatever weaknesses traditional CBT may have" (Hayes, Levin, Plumb-Vilardarga, Boulanger & Pistorello, in press: 1). ACT is and always has been part of the larger family of cognitive and behavioural therapies. ACT's willingness to co-exist with traditional cognitive-behavioural therapies is borne from its appreciation that the same behaviour change can occur via conflicting mechanisms of change. It seems very difficult to dispute, however, that regardless of how the ACT and CBST technologies are conceptualised, ACT's theoretical assumptions about the contextual regulation of behaviour so profoundly contrast with traditional CBT's assumption of cognitive causality that, though CBT was the basis from which ACT developed, ACT has been widely described as belonging to a distinct brand, or 'a new wave', of behaviour therapy (though this claim has been fairly recently disputed by Hofmann & Asmundson (2008)). This does not mean that the ACT technology is original or better than CBST – just different.

Indeed, ACT and CBST are distinctive in several ways which make them ripe for comparison, not integration, as smoking cessation treatments.

At the philosophical level, cognitive-behavioural therapies are based on the assumption that all human behaviour can be predicted by modelling the mind in terms of its elementary forces, parts, and relations in ways which increasingly correspond to an ontological reality. Knowledge is objective and therefore "not reducible to whatever one wants the truth to be" (Hofmann & Asmundson, 2008: 12). ACT is a contextual behavioural therapy which is, by definition, a-ontological; in ACT, the value of a proposed solution is determined by what it buys pragmatically, regardless of whether the solution is 'ontologically true'.

As a consequence, cognitions and environmental contexts are ascribed different degrees of influence over behaviour in CBST and ACT. In CBST, cognitions are thought processes which directly cause emotions and behaviours; in ACT, cognitions are private behaviours which do not cause overt behaviours, including language, except as regulated by context. CBST assumes that the problem as it relates to smoking relapse is that a particular negative cognition, emotion, or physical sensation is occurring too frequently. In ACT, no private event is inherently dysfunctional; rather, smoking relapse is seen to occur in contexts in which the literal, evaluative functions of 'trigger' cognitions dominate over those based in actual experience and so supports the individual to take unnecessary, unhelpful and inflexible avoidant and escapist action.

To sum up this key difference, CBST views a stimulus which precedes smoking as if it was literally what caused smoking to occur and so a good solution would be to avoid or escape this stimulus; in ACT, no stimulus can literally cause smoking to occur by its mere presence but can cause an individual to smoke when the context in which the stimulus is

being viewed supports a literal functions of the verbal label attached to the stimulus, and so a good solution would be foster acceptance of all stimuli by defusing the harmful, literal functions of stimuli from the actual experience of these stimuli.

With regard to technology, the focus in CBST is on the client's learning of a range of adaptive, antecedent-focused coping strategies (i.e. identifying triggers and planning to avoid or cope with them); in ACT, the client's focus is on learning adaptive response-focused coping strategies (responding to smoking CSs for what they are, not what they say they are). In other words, the CBST therapist emphasises the importance of the client's foresight and precipitous action to prevent the maladaptive behaviour, whereas the ACT therapist emphasises the importance of accepting what one is thinking and feeling in the here and now and being willing to respond with behaviours that are linked to long-term values rather than to short-term relief.

In CBST, the therapist's focus is on altering the client's exposure to stimuli which have been conditioned to cue thoughts and feelings which are subjectively experienced as 'urges to smoke, which in turn motivate the client to smoke for negative reinforcement reasons. Therapist recommendations to avoid, alter and substitute smoking triggers should reinforce the belief which prompts many clients to seek therapy: 'my negative thoughts and emotions are not acceptable the way they are. I need to learn how to avoid and change them'. In ACT, the therapist's focus is on weakening the verbal contexts which support the literal functions of the label 'trigger', and in turn, support the client to avoid things they have labelled as 'smoking triggers'. Through cognitive defusion exercises, the ACT therapist establishes verbal contexts which should not only reduce the client's fear of experiencing certain thoughts and feelings but enhance his/her willingness to stay in contact with previously avoided experiences. Therapist recommendations to detect and defuse verbal

labels from the verbal content of cognition should give clients a radically restructured view of the factors which are maintaining their smoking: ‘my thoughts, feelings, and cravings do not themselves cause smoking, but looking at these experiences as if they are literal causes is itself part of the problem’. Note this difference of emphasis on changing what theoretically should be helpful in CBST versus changing what has empirically been shown to be unhelpful in ACT. In ACT, only behaviour can be maladaptive and only behaviour is targeted for change. ACT does not dispute that cognitive change cannot occur, or that it cannot be helpful, but proponents do contest that cognitive change can only occur under contextual control. Thus, manipulation of the contexts, particularly the social-verbal contexts, in which problems have emerged are seen as the best means to influencing behaviour.

Lastly, according to relational frame theory, not only do attempts to change private events miss the nature of the problem and opportunities for their resolution, but cognitive change techniques may themselves account for some treatment failures by encouraging clients to evaluate thoughts, which then breed avoidance excessively through relational networks and risk paradoxical effects. Indeed, several authors have noted the action-limiting effects of the verbal act of labelling thoughts as ‘dysfunctional’ or ‘maladaptive’; that is, verbal evaluation of private events may itself be maladaptive behaviour because such evaluations, regardless of their accuracy, may dissuade future adaptive behaviour.

The analytic methods used to effect change in CBST and ACT also appear to be irreconcilable. In CBST, cognitive change occurs via clients’ scientific, logical, literal, empirical analysis of cognitions based on generating and falsifying hypotheses about themselves and the world. In ACT, metaphors, paradoxes, experiential exercises and other exercises which emphasise the non-linearity of language-behaviour relations and the role of the social-verbal context in mediating the salience of stimulus functions are used to train

clients to respond to thoughts and feelings in terms of their workability for valued behaviour rather than their literality. Proponents of ACT have also claimed that because ACT is concerned with successful working, not building a fuller picture of the world 'as it really is', valued behaviour change occurs much faster in ACT than it does with the putative cognitive modification techniques of CBST.

A final technical difference concerns the different objectives of exposure techniques used in CBST and ACT. In CBST, the traditional purpose of graduating clients' exposure to ritualistically avoided smoking-relevant thoughts and feelings is to allow them to practice new adaptive coping responses to these private events such that the relation between these events and smoking response is extinguished. ACT embraces a model of extinction which is not concerned with eliminating responses or regulating emotions but with adding new response forms to the client's repertoire (e.g. humour, silliness) and creating flexible, values-based action. Interacting more richly with avoided experiences in exposure exercises provides the material for the ACT client to practice core skills of acceptance, defusion and valued action.

Overall, the fundamental principles of ACT's pragmatic philosophy of behaviour-in-context and theory of language and cognition appear to so profoundly conflict with CBST's guiding mechanistic philosophy of behaviour that is difficult to imagine how techniques for manipulating each model's putative mechanisms of smoking behaviour change could be coherently integrated into a single behavioural treatment for smoking cessation without violating at least several of these fundamental principles. Some authors (e.g. Hofmann & Asmundson, 2008) have disputed this assertion however, and the question is admittedly far from settled.

Nonetheless, CBST and ACT presently appear better suited to exist as behavioural alternative options to one another in the smoking cessation treatment armamentarium for three reasons: (i) ACT has developed out of traditional CBT in the sense that ACT "reformulated and synthesises previous generations of behaviour and cognitive therapy" (Hayes et al., 2004: 658); (ii) CBST is the most widely used and empirically-supported behavioural treatment for smoking cessation; and (iii) as a gradual consequence of (i), the philosophical and theoretical bases and technologies of CBST and ACT appear to be largely irreconcilable. Comparing these models directly against one another will not only inform the extents to which each enhances clinicians' prediction and understanding of the processes of smoking cessation and relapse, but also the potential operative power of relational frame theory and classical learning theories for increasing other health behaviours. It is important, however, that investigators continue to take up the challenge of developing hybrid ACT/CBST models that are both more effective than either model alone and faithful to the core principles of each model.

13.4. STUDY CONCLUSIONS

Cessation from smoking typically occasions levels of negative affect, craving, and somatic discomfort that can be extremely difficult to tolerate. It is understandable that smokers do not want to feel badly and resuming smoking becomes quickly learned as a quick and efficient method of alleviating some of their withdrawal discomfort and other sources of stress. The repeated pairings of these negative private events with smoking gradually support smokers to view these experiences as if they are actually causing smoking, which gives rise to the notion that quitting smoking is essentially a matter of getting rid of the negative

experiences which are causing smoking. Formulated another way, if negative private events cannot be removed or reduced, they will continue to 'cause' smoking. It is understandable, therefore, that coping actions which facilitate avoidance and escape of these experiences become highly attractive to smokers, and that an entire treatment industry has now dedicated itself to helping smokers master strategies aimed at eliminating and controlling negative private events.

However, avoidance-based coping need not be the only option for smokers who wish to quit. The present findings provide a rationale for organising behavioural interventions for smoking cessation around techniques which weaken the social-verbal contexts which support cognitive fusion and rationalise unworkable avoidance responding to internal smoking cues, and establish new contexts which foster smokers' willingness to experience previously avoided cues without acting upon them, as a functional alternative to the current standard in behavioural intervention for smoking cessation, CBST. The question remains, however, as to the variables which accounted for CBST's effectiveness in producing smoking abstinence.

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APPENDIX A: CRITERIA FOR EXCLUSION AND INCLUSION IN THE STUDY INTERVENTION PHASE.

Please carefully read each criterion below and indicate whether or not you satisfy *all* criteria.

Inclusion criteria

- Self-identified nicotine-dependent smokers smoking 10 cigarettes or more per day for at least 12 months with FTND scores of 5 or more.
- Stated current desire to quit smoking in the near future.
- Previous quit attempt lasting at least 24-hrs.
- Agree to complete an experimental phase prior to the active intervention phase.

- Agree to be randomly assigned to one of two types of behavioural intervention for smoking cessation.
- Agree to attend one 2-hr meeting each week for four consecutive weeks.
- Agree not to seek adjunctive treatment for smoking cessation during the active 4-week intervention phase.
- Agree to participate in follow-up assessments up to 6 months after the quit date.

Exclusion criteria

- Under 18 years of age or over 65 years of age.
- Non-fluent English reader or speaker.
- Currently receiving other counselling or behavioural therapy for smoking cessation, or using nicotine replacement therapy (e.g. nicotine gum, patch, inhalator, lozenge, or nasal spray) or pharmacotherapies with potential or proven cessation efficacy (e.g. bupropion SR, fluoxetine, clonidine, varenicline, bupsirone, doxepin) during the 4-week active intervention period.
- Currently using tobacco products other than cigarettes.
- Diagnosis of alcohol or drug dependence (excluding nicotine) within the last 12 months.
- Currently or planning to become pregnant during the 4-week active intervention period.
- Currently using or recently consumed substances which contravened legislation set out in the *Misuse of Drugs Act, 1971* and the *Misuse of Drugs Regulations, 2001*.
- Previous or present diagnosis of a psychotic disorder, including borderline mental retardation.
- Active affective disorders, including major depressive disorder, bipolar disorder, or anxiety disorders.
- Living with anyone who is currently or has been enrolled in this smoking cessation study.

I confirm that am eligible to participate in this smoking cessation study based on the above criteria. I understand that I am free to withdraw from the study at any time without explanation and that any information provided hitherto my withdrawal will be discarded.

Name (PRINT): Date:

Signature:

APPENDIX B: SMOKING AND DEMOGRAPHICS QUESTIONNAIRE

Participant Name:

Date of intake:

This questionnaire should take no more than ten minutes to complete. Just ask Christopher if you're not sure about anything. Your answers are treated as confidential and will be used solely for the purpose of this study.

Please hand to Christopher when finished.

Part One: Demographic details

1. How old are you?

Years / Months

_____ / _____

2.	Are you: *(Circle one answer)*	**Single**	**1**
		Separated/divorced	**2**
		Married/living with partner	**3**
		Other….	**4**

3.	Are you:	**In paid employment**	**1**
		Unemployed	**2**
		Looking after the home	**3**
		Retired	**4**
		Full-time student	**5**
		Other	**6**

4.	What is your highest educational qualification?	**None**	**1**
		GCSE or equivalent	**2**
		A level or equivalent	**3**
		Degree or equivalent	**4**
		PG Degree or equivalent	**5**
		Doctorate Degree	**6**
		Other	**7**
5.	Are you:	**Male**	**0**
		Female	**1**

6. What is your ethnic group?	**White**	**0**
	Black Caribbean	**1**
	Black African	**2**
	Black Other	**3**
	Indian	**4**
	Pakistani	**5**
	Bangladeshi	**6**
	Chinese	**7**
	Asian Other	**8**
	Other	**9**
	Mixed ethnic group	**10**

Part Two: These questions ask about your smoking history.

1. Have you made a serious attempt to stop smoking before?

No

Yes, _____ times

---

2. At what age did you start smoking regularly (i.e. at least one cigarette per week)?

Years Old

_____

---

2. What is the longest that a quit attempt has lasted in the past?

Never tried to quit

Less than one day

Years / Months / Days

_____ / _____ / _____

---

3. What is your main reason for coming to this meeting?	**Trying to cut down** **Trying to give up** **Trying to gain more self-control**
4. How many cigarettes do you smoke per day when smoking regularly?	
5. How long have you been a regular smoker?	**Years / Months** _____ / _____
6. Have you ever used nicotine replacement products in the past? (e.g. gums, patches, lozenges, medicines, injections)	**Yes** **No**

			3
7.	How soon after you wake up do you smoke your first cigarette?	**Within 5 minutes**	
		6-30 minutes	**2**
		More than 30 minutes	**1**
		After 60 minutes	**0**
8.	Do you find it difficult to stop smoking in no-smoking areas?	**No**	**0**
		Yes	**1**
9.	Which cigarette would you hate most to give up?	**The first of the morning**	**1**
		Any other	**0**
			0
10.	Do you smoke more frequently in the first hours after waking than during the rest of the day?	**No**	**1**
		Yes	
			0
11.	Do you smoke if you are so ill that you are in bed most of the day?	**No**	**1**
		Yes	

Part Three: These questions ask about your motivation to stop smoking.

1.	How important is it to you to give up smoking altogether at this attempt?	**Desperately important**	**4**
		Very important	**3**
		Quite important	**2**
		Not all that important	**1**
2.	How determined are you to give up smoking at this attempt?	**Extremely determined**	**4**
		Very determined	**3**
		Quite determined	**2**
		Not all that determined	**1**

3.	What is the main reason for you wanting to change your smoking habit at the moment? *(Circle the most important reason)*	**My health is already suffering** **5** **I am worried about my future health** **4** **Smoking costs too much** **3** **Because other people have asked me to** **2** **For my family's health** **1** **Other…** **Please state:** **0**

4.	How high would you rate your chances of giving up smoking for good at this attempt?	**Extremely high**	**6**
		Very high	**5**
		Quite high	**4**
		Not very high	**3**
		Low	**2**
		Very low	**1**
5.	How much do believe you are physically addicted to nicotine?	**I believe I am addicted**	**5**
		I believe I am probably addicted	**4**
		I'm not sure if I'm addicted or not	**3**
		I believe I'm probably not addicted	**2**
		I do not believe I am addicted	**1**