Motivation to Smoke: The Role of Personality, Smoking Outcome Expectancies and Nicotine Dependence

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BsocSc

Submitted as a requirement for the degree of Bachelor of Arts with Honours, Psychology Strand.

Swinburne University of Technology
13th October, 2006

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Word Count: 10,862
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Declaration

I declare that this report does not incorporate without acknowledgment any material previously submitted for a degree in any University, College of Advanced Education, or other educational institution, and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

I further declare that the ethical principles and procedures specified in the Faculty of Life and Social Sciences Human Research Ethics Committee document have been adhered to in the preparation of this report.

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Signed:
Acknowledgements

There are a number of people I would like to thank for their assistance in completing this thesis. Firstly, I would like to thank my supervisor, Dr Greg Murray. You helped me every step of the way, your enthusiasm and belief in my abilities made this task a very rewarding experience. You are an inspiration to the field of psychology and I could not have wished for a better supervisor.

I must also thank my family, whose consistent support has not gone unnoticed. Thankyou for always being there for me and helping out in every way you can.

Patch and Haley, your company and shared endure throughout this year have made my studies a pleasurable experience. I wish you both the best of luck with your thesis this year, and wish you great success in your journey to follow.

Lastly, I must thank my close friends, the names of whom are too numerous to list here. Thank-you for keeping me sane by showing me there is life outside the square.
Abstract

The primary aim of this study was to investigate the complex relationship between personality, smoking outcome expectancies and smoking behaviour. A secondary focus was the role of nicotine dependence in smoking. Students from a 1st year Psychology course and additional participants recruited using a snowballing technique (N=151) completed a questionnaire assessing the Big Five personality dimensions Neuroticism (N), Extraversion (E), Openness (O), Conscientiousness (C), Agreeableness (A), smoking outcome expectancies, nicotine dependence and smoking behaviour. It was predicted that the relationship between N, and E and smoking behaviour would be mediated by the expectancies of Negative Affect Reduction and Stimulation-State Enhancement respectively. It was found that the traits of N and E did not relate to smoking behaviour. Subsequently, the mediational hypothesis was not supported. As predicted, however, the expectancy of Negative Affect Reduction related to smoking behaviour, although the expectancy Stimulation-State Enhancement was not. This study also explored whether C moderated the relationship between the expectancy of Health Risks and smoking behaviour. Results did not support this notion. As expected, nicotine dependence was related to smoking, which was unaffected by the inclusion of non-smokers in post hoc analysis. Unexpectedly, this study found that people low on A tended to smoke more. Findings were interpreted relative to cultural change in perceptions on smoking. Results have implications for smoking prevention and cessation programs.
Chapter 1

1.1 Overview

Tobacco smoking is the single greatest preventable cause of premature death and disease in Australia (Hill & Carroll, 2003). Smoking is a recognised risk factor for a range of chronic diseases, including cardiovascular disease, chronic obstructive pulmonary disease, lung cancer (Irbarren, Tekawa, Sidney & Friedman, 1999) and an increased death rate (Napoli, 2004). After consistent declines in the prevalence of smoking from around 60% of men and 30% of women in the early 1960s, this reduction appeared to stand in the early 1990s at around 27% of men and 23% of women (Hill & Carroll, 2003). The relatively large declines in the prevalence of smoking behaviour seen in the early to mid – 1980s coincided with the onset of funded public health campaigns promoting quitting in Australia and may reflect the impact of these campaigns (White et al., 2003). The Australian government committed $7 million (AUD) over two financial years to a cessation focused Tobacco Campaign (NTC) targeting smokers aged 18-40 years (Hill & Carroll, 2003). The current study aims to extend upon existing literature on motivation to smoke, with the ultimate aim of informing personalized programs of smoking prevention and cessation to further reduce the prevalence of smoking in Australia.

*Smoking motivation* refers to incentives to smoke (Luijic, Reuter & Netter, 2005). Theories on smoking motivation have been suggested to explain the conditions and causes of smoking, as well as its maintenance. Subsequently, theories of smoking motivation have been the primary focus of smoking prevention and cessation programs
One theory of motivation is personality influences. Personality traits refer to individual differences that are assumed to reflect underlying, internal and stable dispositions (McAdams, 2000). Personality related approaches to smoking are based on the assumption that smokers and non-smokers differ in personality structure, which determines if someone becomes a permanent smoker (Luijic et al, 2005). They have been found to aid smoking cessation programs by matching interventions to individuals’ needs (Terracciano & Costa, 2004). Another theory of smoking motivation is cognitive expectancies, defined as anticipation of a systematic relationship between events in some future situation (Goldman, Brown & Christiansen, 1987). Expectancies have been found to be valid predictors of drug withdrawal symptoms and the distress occasioned by abstinence (Wetter, Smith, Kenford, Jorenby, Fiore, Hurt, Offord & Baker, 1994).

Furthermore and distinct from individual differences and cognitions, another theory of motivation to smoke is physiological nicotine dependence. This theory postulates that smokers experience direct pharmacological reward from nicotine, which encourages the behaviour. Nicotine dependence theories have been found beneficial to smoking cessation programs by implementing strategies for managing the cravings experienced by smoking abstinence (Luijic et al., 2005).

Whilst there are numerous theories on different motives to smoke (Luijic et al., 1005), this study primarily focused on personality and cognitive expectancies with a secondary focus on physiological dependence. The following review will now examine the literature associated with personality, smoking outcome expectancies and smoking behaviour.
1.2 Personality and smoking behaviour

Personality is one of the major risk factors disposing individuals to engage in risky health behaviours (Vollrath & Torgersen, 2002). Whilst there are numerous theories on how many traits constitute personality (McAdams, 2000), this current study focused on the commonly used Five-Factor Model (FFM) of personality (McAdams, 2000). Traits refer to individual differences among people in characteristic thoughts, feelings, and behaviours (McAdams, 2000). The FFM traits include; Neuroticism (N), Extraversion (E), Openness (O), Agreeableness (A) and Conscientiousness (C). Previous research exploring the relationship between the Big Five traits and smoking behaviour will now be examined.

1.2.1 The traits N and E

Neuroticism encompasses anxiety, angry hostility, depression, self-consciousness, impulsiveness, and vulnerability. Watson and Clark (1984) point out that this general personality dimension is concerned with individual differences in the tendency to experience negative emotions, including sadness, anger, fear, anxiety and guilt. Consequently N has been previously labelled ‘negative affectivity’ (McAdams, 2000). Extraversion, in contrast, includes warmth, gregariousness, assertiveness, activity, excitement seeking and positive emotions. A significant body of research has found E positively associated with reports of feeling good about life (McAdams, 2000). The majority of research has identified N and E as having a positive relationship with smoking behaviour (Jeanne et al, 2005; Jones & Lejuez, 2005; Vollrath & Torgersen, 2002).
Eysenck’s (1980) personality theory, suggests that people high in N would smoke to reduce anxiety and tension, whereas people high in E would smoke in search of stimulation. Pharmacological effects of nicotine on the central nervous system further comprehend Eysenck’s personality theory (Lujic et al, 2005). For example nicotine has a biphasic action on the central nervous system, by which it increases arousal in low doses and decreases arousal in higher concentrations. More specifically, low doses of nicotine stimulate the neurons in the brain, and in high doses inhibit the arousal of neurons. These effects can be confirmed by Positron Emission Tomography (PET) studies measuring regional cortical blood flow as an indicator of cerebral activation (Lujic et al, 2005).

The pharmacological effects of nicotine for people high in N and E can also be understood using theories of affect regulation and arousal modulation models (Lujic et al, 2005). Theories of affect regulation suggest that smoking influences emotional states. Cigarettes have been argued to regulate affective states, particularly the regulation of negative affect such as anxiety, tension and irritability. People that smoke to regulate anxiety engage in ‘sedation smoking’. Sedation smokers’ use cigarettes in order to cope with negative affect like tension and irritability (Lujic et al, 2005). Thus it was anticipated that people high in N were more likely to smoke. As outlined by Lujic et al. (2005), arousal modulation models are primarily concerned with the control of arousal levels. Smokers use nicotine to shift their cortical arousal to an optimal level. People who smoke to increase arousal engage in ‘stimulation smoking’. Stimulation smokers’ benefit from the arousal properties of nicotine to increase their attention, concentration and to maintain performance. People high in E search for stimulation and it therefore was anticipated that they were more likely to smoke cigarettes.
1.2.2 The trait C

Conscientiousness encompasses the characteristics of personality that centre on how hard-working, self-disciplined, responsible, reliable, dutiful, well-organized, and persevering a person is. At the high end of the C dimension, people may be described as well-organised, efficient, and dependable (McAdams, 2000). The majority of studies have found that people low on C tend to smoke more (Malouff et al, 2006; McCann 2005). As argued by Vollrath and Torgersen (2002), a person low in C finds it more difficult to restrain from the urge to smoke. For example, people low in C tend to have reduced self-discipline and consequently find it difficult to control the urge to smoke. Thus it was anticipated that the trait C would relate negatively to smoking behaviour.

1.2.3 The trait A

Agreeableness features the interpersonal or social aspects of personality. People high in A are interpersonally warm, accommodating, helpful, courteous and sincere. Those low in A are considered antagonistic, unsympathetic, manipulative, crude and even cruel (McAdams, 2000). There have been inconsistent findings relating A to smoking. Whilst Malouff, Thoresteinsson and Schutte (2006) found that individuals low on A tend to smoke more, McCann (2005) and Malouff et al. (2006) found no relationship between A and smoking. Therefore, in this study, the relationship between A and smoking was exploratory.
1.2.4 The trait O

The trait of Openness was previously considered to relate to culture and intelligence, and has been defined by Costa and McCrae (2000) as a “matter of inner experience and mental phenomena related to the scope of a person’s awareness and the intensity of his or her consciousness” (p337). People low on O are thought to be conventional, down-to-earth, uncreative, simple, traditional and non-adventurous. There have been inconsistent findings relating O to smoking (McCann, 2005). Therefore, in this study, the relationship between O and smoking was exploratory.

1.2.5 Cultural change

Previous research provides an understanding of the relationship between personality and smoking behaviour. There has been recent cultural change on perceptions of smoking, and thus interpretation of the relationship between personality and smoking will be evaluated (section 4.2) in light of this recent cultural change.

As outlined above, smoking prevalence has decreased over time (White et al, 2003). Since the awareness of health concerns regarding smoking, there have been many policy changes including restrictions on public smoking, health campaigns to increase awareness, and control of tobacco advertising. Prior to such health warnings smoking was an accepted practice. Nowadays it has become increasingly ‘frowned upon’ (Makkai, 1998). This is largely due to the negative connotations attached to smoking as harmful to self and others (e.g. passive smoking; Encyclopedia Britannica, 2006). Such suppression in society has subsequently meant that smoking is a symbol of individualism and resistance. Cigarette use, consequently, has been labelled as more ‘individualistic’ and
less ceremonial than it once was (Encyclopedia Britannica, 2006). Cultural change will be considered in the interpretation of findings of this study.

1.3 Smoking outcome expectancies and smoking behaviour

Expectancy theory (Wetter et al., 1994) explains behaviour in terms of holding expectations of certain reinforcing effects as being the outcome of engaging in a particular behaviour. Expectancies can either promote or inhibit behavioural responses to certain events (Cohen, McCarthy, Brown & Myers, 2002).

The majority of literature on more general drug outcome expectancies as a motive for drug use has focused on the expected consequences of alcohol use (Cohen et al, 2002; Wetter et al, 1994). As outlined by Cepeda-Benito Benito and Ferrer (2000), alcohol expectancies are predictive of future drinking, discriminate between problematic and non-problem drinkers, influence the occurrence and amount of drinking, and appear to moderate treatment outcomes. This pattern of results appears to generalize to smoking behaviour. For example, Cohen et al. (2002) found a positive correlation between smoking outcome expectancies and a perceived lack of control of smoking in an American sample. Furthermore, expectancies for positive outcomes have been found to strongly relate to consumption of cigarettes (Brandon & Baker, 1991). It appears then, that the level to which a person expects to receive a positive experience from smoking relates to how much they engage in that behaviour.

This study focused on three smoking outcome expectancies as derived from the SCQ-A (Copeland, Brandon & Quinn, 1995). These outcome expectancies included Negative Affect Reduction, Stimulation-State Enhancement, and Health Risks. The
expectancy of Negative Affect Reduction refers to the anticipation that smoking would reduce feelings of anxiety, tension and irritability. People who hold this belief smoke to calm down when feeling nervous, help cope when upset with someone, and to relax (Jeffries, Catley, Okuyemi, Nazir, McCarter, Grobe & Ahluwalia, 2004). In a study by Brandon and Baker (1991) using the original SCQ, the expectation that smoking would be relaxing related positively to cigarette consumption. Similarly, a study by Jeffries et al. (2004) using the SCQ-A, found that the level of expectancy of Negative Affect Reduction was higher for heavy smokers comparative to light smokers. The stronger the expectancy that smoking would reduce negative affect, the more cigarettes a person smoked. Thus it was anticipated that the expectancy of Negative Affect Reduction would be positively related to smoking behaviour.

The expectation of Stimulation-State Enhancement refers to the anticipation that smoking would increase stimulation. People who smoke expecting an increase in arousal engage in the behaviour to give themselves energy when bored or tired, and believe it will make them feel good (Jeffries et al, 2004). Brandon and Baker (1991) found that expectation of mood enhancement related positively to cigarette consumption. Similarly, Jeffries et al. (2004) found that the level of the expectancy of Stimulation-State Enhancement was higher for heavy smokers, comparative to light smokers. The stronger the expectancy that smoking would enhance stimulation, the more cigarettes a person smoked. Thus it was anticipated that the expectancy of Stimulation-State Enhancement would relate positively to smoking behaviour.

The expectancy of Health Risks refers to the anticipation that smoking would result in health problems. People who expect that smoking will result in Health Risks
understand that the more they smoke the more likely they may acquire health dilemmas such as lung cancer (Jeffries et al, 2004). Cohen et al. (2002), found a weak relationship between the expectancy of Health Risks and smoking. Jeffries et al. (2002), however, found the relationship to be nonexistent, and indicated that there was no difference between smokers and non-smokers in their beliefs on Health Risks. Thus smokers continued to engage in the behaviour despite anticipating they were risking their health. The lack of a strong association between the expectancy of Health Risks and smoking was explored, in this study, relative to personality, and is explained in detail below (section 1.4.4).

1.4 Personality, smoking outcome expectancies and smoking behaviour

As described above, personality has been found to relate to smoking behaviour. More specifically, people with higher levels of E and N, and lower levels of C tended to smoke more. In addition, expectancies have also been found to relate to smoking behaviour. For example, people high on the expectancies of Negative Affect Reduction and Stimulation-State Enhancement also tended to smoke more.

This study aimed to investigate the potential interaction between personality and smoking outcome expectancies in predicting smoking behaviour. The present study sought to test three models, which may capture this complex relationship. As will now be discussed, the first two are mediational models, and the third is a moderational model.
1.4.1 Mediation models

As outlined by Baron and Kenny (1986), mediation refers to the idea that the effects of a stimulus on behavior are mediated by various transformation processes internal to the organism. In general, a given variable may be said to function as a mediator to the extent that it accounts for the relation between the predictor and the dependent variable.

A comprehensive model called ‘The Acquired Prepardness Model’ by McCarthy, Kroll and Smith (2001) incorporates both personality and expectancy variables in the prediction of drinking behaviour. This model proposes that alcohol expectancies mediate the relationship between the reward seeking personality style typical of neurotic extraverts and drinking behaviour. Neurotic extraversion was derived from Patterson and Newman’s (1993) personality characteristic of disinhibition. McCarthy et al. (2001) found that neurotic extraversion was positively related to the biased formation of expectancies. These variables then predicted drinking behaviour.

Based on the work of McCarthy et al. (2001), two mediational hypothesis were derived. The first relates to the interaction between N and the expectancy of Negative Affect Reduction in predicting smoking behaviour. The second relates to the interaction between E and the expectancy of Stimulation-State Enhancement in predicting smoking behaviour. These will now be discussed in turn.

1.4.2 The mediation of Negative Affect Reduction

Previous research shows that N relates to smoking behaviour. Furthermore, the expectancy of Negative Affect Reduction has been found to relate to smoking behaviour. It could be predicted that N is associated with the expectancy Negative Affect Reduction,
which subsequently leads to smoking more cigarettes. More specifically, the expectancy that smoking reduces negative affect may mediate the relationship between N and smoking.

As outlined by Baron and Kenny (1986) mediators explain how external physical events take on internal psychological significance. For example, the proximal cognitive expectancy of Negative Affect Reduction takes on internal psychological significance for people high on N. This is because people high in N tend to have high levels of negative affect (McAdams, 2000), and therefore smoke for the effect of reduced anxiety and tension, and subsequently come to expect that effect from smoking (Eysenck, 1980; see section 1.2.1). Thus it was predicted that the expectancy of Negative Affect Reduction would mediate the relationship between the personality trait N and smoking behaviour. This relationship is depicted below in Figure 1.

![Diagram](image)

*Figure 1. The Relationship Between N and Smoking Behaviour as Mediated by Negative Affect Reduction.*
The first criterion of this mediational relationship was that N related significantly to smoking behaviour (Path C). The second criterion of mediation is that the expectancy of Negative Affect Reduction relates to smoking behaviour (Path B). The third criterion for mediation is that the Trait N relates to Negative Affect Reduction (Path A). The fourth criterion is that the relationship between N and smoking behaviour will reduce when the expectancy Negative Affect Reduction was added to the model and statistically controlled (Baron & Kanny, 1986).

1.4.3 The mediation of Stimulation-State Enhancement

As previous research shows, E related to smoking behaviour. Furthermore, the expectancy of Stimulation-State Enhancement related to smoking behaviour. It could be predicted that E is associated with the expectancy Stimulation-State Enhancement, which subsequently leads to smoking more cigarettes. More specifically, the expectancy that smoking enhances stimulation may mediate the relationship between E and smoking.

As mentioned above, and outlined by Baron and Kenny (1986), mediators explain how external physical events take on internal psychological significance. For example, the proximal cognitive expectancy of Stimulation-State Enhancement takes on internal psychological significance for people high on E. This is because people high in E tend to search for stimulation (McAdams, 2000), and therefore smoke for the effect of increased arousal, and subsequently come to expect that effect from smoking (Eysenck, 1980; see section 1.2.1). Thus it was predicted that the expectancy of Stimulation-State Enhancement would mediate the relationship between the personality trait E and smoking behaviour. This relationship is depicted below in Figure 2.
Figure 2. The Relationship Between Extraversion and Smoking Behaviour as Mediated by Stimulation-State Enhancement.

The first criterion of this mediational relationship was that Extraversion related significantly to smoking behaviour (Path C). The second criterion of mediation is that the expectancy of Stimulation-State relates to smoking behaviour (Path B). The third criterion for mediation is that Trait Extraversion relates to Stimulation-State Enhancement (Path A). The fourth criterion is that the relationship between Extraversion and smoking behaviour will reduce when the expectancy Stimulation-State Enhancement was added to the model and statistically controlled (Baron & Kenny, 1986).

1.4.4 Moderational model

Moderation refers to the affects of a variable on the direction and/or strength of the relation between an independent or predictor variable and a dependent variable (Baron & Kenny, 1986).

The relationship between the expectancy of Health Risks and smoking behaviour has been found to be weak (Cohen et al, 2002) or nonexistent (Jeffries et al,
However, there has been a lack of research into the relationship between the expectancy of Health Risks and smoking behaviour. This study explores whether level of Conscientiousness affects the strength of the relationship between the expectancy of Health Risks and smoking behaviour.

A study by Finn et al. (2005) explores a possible reason for inconsistencies in the relationship between alcohol use and negative expectancies such as Health Risks. Finn et al. (2005) theorised that the poor inhibitory control associated with impulsivity moderates the association between negative expectancies and drinking, and results supported this notion. Thus a relationship between the expectancy of Health Risks and smoking may only exist for those low/high in inhibitory control. For example, it may be possible that individuals might continue to smoke despite the expectancy that smoking would be harmful to their health, because of their inability to control their urges. Someone who is unable to control those urges can be described as someone low on C based on their lack of self-discipline. People high in C on the other hand tend to be self-disciplined, responsible, and dutiful. Therefore they are more likely to control their urge to smoke when they believe it is harmful to their health. Given the lack of empirical research to support the proposed notion, this study explored whether C moderates the relationship between the expectancy of Health Risks and smoking behaviour. The moderational model explored in this study is displayed in Figure 3 below.
Figure 3. The relationship Between Health Risks and Smoking Behaviour as Moderated by Conscientiousness.

The criterion of this relationship was that the interaction between C and Health Risks, as demonstrated in Figure 3, relates significantly to smoking behaviour (Baron & Kenny, 1986).

1.5 Physiological Dependence

The primary focus of this study related to the motives of personality and smoking outcome expectancies as predictors of smoking behaviour. However there is another aspect of smoking motivation relating to its physiological components. Dependence has been identified as a pharmacological motive for smoking maintenance (Lujic et al, 2005). The Diagnostic Statistical Manual of Mental Disorder (DSM-IV) defines substance dependence as “A maladative pattern of substance use, leading to clinically significant impairment or distress” (APS, 2000). Its physiological nature sets this motive apart from personality and cognitions, however it is an important aspect of smoking motivation and for completeness in assessment on motivations to smoke, was
also investigated. Previous research demonstrates a positive relationship between smoking behaviour and nicotine dependence (Storr, Reboussin & Anthony, 2005). This can be theoretically understood by the addictive properties of nicotine that can ultimately lead to a persistent desire to use greater quantities of the substance (APS, 2000). Thus this study expected that nicotine dependence would be positively related to smoking behaviour.

1.6 Research aims

The current study aimed to extend upon existing research into motivation to smoke, with the ultimate aim of informing personalized programs of smoking prevention and smoking cessation. More specifically, the primary focus was to evaluate the complex relationship between personality, smoking outcome expectancies and smoking behaviour. First, the study sought to examine the utility of personality traits in understanding smoking behaviour. Secondly the study sought to examine the relationship between smoking outcome expectancies and smoking behaviour. Thirdly the study evaluated the complex relationship between personality, smoking outcome expectancies and smoking behaviour. While the primary focus of the present project was on personality and expectancies as predictors, for completeness a broader perspective on motivation to smoke was obtained by also including a measure of nicotine dependence. This enables a discrete focus on the physiological aspect of smoking motivation designed to provide a more comprehensive analysis of why people smoke.
1.7 Hypotheses and research questions

It was hypothesised that:

1. The personality trait N would be positively associated with smoking behaviour.
2. The personality trait E would be positively associated with smoking behaviour.
3. The personality trait C would be negatively associated with smoking behaviour.
4. The expectancy of Negative Affect Reduction as derived from the SCQ-A (Copeland et al, 1995) would be positively associated with smoking behaviour.
5. The expectancy of Stimulation-State Enhancement as derived from the SCQ-A (1995) would be positively associated with smoking behaviour.
6. The personality trait N would have a positive relationship with the expectancy of Negative Affect Reduction.
7. The personality trait E would have a positive relationship with the expectancy of Stimulation-State Enhancement.
8. The expectancy of Negative Affect Reduction would mediate the relationship between the personality trait Neuroticism and smoking behaviour.
9. The expectancy of Stimulation-State Enhancement would mediate the relationship between the personality trait Extraversion and smoking behaviour.
10. In addition, the present study explored whether the personality trait Conscientiousness moderates the relationship between the expectancy of Health Risks and smoking behaviour.
11. Lastly it was predicted that nicotine dependence would be positively related to smoking behaviour.
Chapter 2: Method

2.1 Participants

Participants were initially recruited from an introductory psychology course taught at both Lilydale and Hawthorn campuses of Swinburne University of Technology. Students in this course are required to participate in research as a component of a Research Experience Program (REP), and were given credit for their participation. In an effort to recruit a larger sample, an adjunctive snow-balling strategy was implemented whereby friends and acquaintances of the principal researcher were solicited to participate. The final sample consisted of 151 participants (Male = 36, Female = 103, Missing on gender = 12), aged between 18 and 61 ($M = 23.20$, $SD = 8.64$). The majority of the participants’ were students (54.3%), followed by full-time workers (19.9%), part-time workers (18.5%), home duties (2.6%), were unemployed (3.3%), or other (1.3%). The majority of participants’ were single (77.5%), followed by married/de facto married (11.3%), divorced/separated (3.3%), widowed (0.7%), or other (7.3%).

2.2 Materials

Participants completed a questionnaire designed to measure smoking behaviour, nicotine dependence, personality and smoking outcome expectancies. They were also required to complete demographic questions such as age, sex, employment and marital status (see Appendix A for a complete copy of the questionnaire).
2.2.1 Smoking Behaviour

There are different stages of smoking behaviour, which include initiation, maintenance and cessation of the behaviour (Luijic et al, 2005). Smoking behaviour can be further assessed in terms of frequency or status. Smoking frequency is a metric measure relating to the number of cigarettes smoked per day (CPD). Smoking status refers to categories of smokers and non-smokers and can be ordinal (more than two categories). Many studies have categorized CPD into an ordinal variable (Jeanne et al, 2005, Vollrath & Torgersen, 2002). It was considered beneficial to create an ordinal categorical variable from non-smoker (0 CPD), light (1-10 CPD), moderate (11-19CPD) and heavy smoker (20 + CPD) (Durkin, Germain, Letcher & Lipscomb, 2005; Jeffries et al, 2004; Okuyemi, 2001). This permits both smokers and non-smokers for analysis, whilst indicating the degree of the behaviour. The operationalisation of smoking behaviour into ordinal categories was referred to as smoking status. As derived from the World Health Organisation, participants were asked “do you smoke nowadays?” and if they answered yes they were then asked “Looking back over the past month, on average how many cigarettes do you smoke in a day?”. The four categories of smoking status were then computed into an ordinal variable. Test-retest reliability for CPD has been found to be high at .94 (Etter & Perneger, 2001). Construct validity has also been demonstrated where CPD related to saliva continine levels, which reflects the amount of nicotine smoked (Etter & Perneger, 2001).
2.2.2 Nicotine Dependence

Nicotine dependence was measured using the six-item Fagerstrom Test For Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker & Fagerstrom, 1991). The FTND represents a revised and abbreviated version of the Fagerstrom Tolerance Questionnaire (FTQ; Fagerstrom, 1978). An example item on the FTND includes “How many cigarettes a day do you smoke?” (see Appendix B for complete copy of FTND). Scores from the FTND range from 0 to 10, whereby 10 is the highest level of nicotine dependence and 0 represents no nicotine dependence (Hooten, Wolter, Ames, Hurt, Vickers, Offord & Hays, 2005). The reported reliability was considered acceptable, with an alpha coefficient of 0.68 (Etter, 2005). The FTND has been found to reliably predict smoking abstinence after treatment, and correlates with biochemical measures of nicotine dependence, thus providing evidence of construct validity (Heatherton et al, 1991). Only current smokers were instructed to complete the questions regarding nicotine dependence.

2.2.3 Personality

The NEO Five-Factor Inventory (NEO-FFI; Costa & McCrae, 1992) was used to measure the personality traits of Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. The NEO-FFI comprises 60 items and is an abbreviated version of the NEO Personality Inventory-Revised (NEO PI-R; Costa & McCrae, 1991).

All trait scales had a possible range of 12-60 with high values indicating high levels of the personality trait. An example item for the N scale is “I am not a worrier”. Items 1, 16, 31 and 46 were reverse coded. An example item for the E scale is “I like to
be where the action is”. Items number 12, 27, 42 and 57 were reverse coded. An example item for the O scale is “I am intrigued by the patterns I find in art and nature”. Items number 3, 8, 18, 23, 33, 38 and 48 were reverse coded. An example item for the A scale is “I try to be courteous to everyone I meet”. Items 9, 14, 24, 29, 39, 44, 54 and 59 were reverse coded. An example item for the C scale is “I keep my belongings clean and neat”. Items number 15, 30, 45, 55 were reverse coded.

Participants rated their level of agreement for each statement on a Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Higher scores for each subscale reflected greater levels of that particular personality trait. Costa and McCrae (1992) found coefficients of internal consistency for the NEO-FFI ranging from .68 to .89. There is also clear evidence of convergent and discriminant validity of the NEO-FFI when correlated with the domains on the NEO-PI-R (Costa & McCrae, 1991). It is important to note that the NEO-FFI does not provide facet scores.

2.2.4 Smoking Outcome Expectancies

The Smoking Consequences Questionnaire-Adult (SCQ-A) (Copeland et al, 1995) is a revised version of the Smoking Consequences Questionnaire (Brandon & Baker, 1991), first developed for college students. The SCQ-A contains 55 items from which are reduced to 10 subscales. The 10 scales include the expectancy of: Negative Affect Reduction, Stimulation-State Enhancement, Health Risks, Taste/Sensorimotor Manipulation, Social Facilitation, Appetite/Weight Control, Craving Addiction, Negative Physical Feelings, Boredom Reduction and Negative Social Impression. Of particular
interest to this study were the expectancies of Negative Affect Reduction, Stimulation-State Enhancement and Health Risks.

   The Negative Affect Reduction scale is comprised of 9 items and has a possible range of 0-81. An example item for this subscale is “When I am angry a cigarette can calm me down”. The Stimulation-State Enhancement scale comprises 6 items and has a possible range of 0-54. An example item from this subscale is “Smoking a cigarette energizes me”. The Health Risks subscale comprises 4 items and has a possible range of 0-36. An example item from this subscale is “Smoking is hazardous to my health”.

   Participants rate how likely or unlikely they believed each consequence is on a 9-point Likert scale (0 = completely unlikely to 9 = completely likely). The reported reliabilities for the SCQ-A are good, with Chronbach’s alpha values ranging from .70 to .90 (Jeffries et al, 2004). The SCQ-A has also been found to have construct validity with nicotine dependence correlating positively with the expectancy of Negative Affect Reduction and Stimulation-State Enhancement (Copeland et al, 1995).

2.3 Procedure

   Ethics approval for the study was obtained from the Swinburne University, Faculty of Life and Social Science Ethics Committee. Following ethics approval, the data was collected via a pen and paper questionnaire. The measures were presented in the following order: smoking behaviour (WHO), the FTND (Heatherton et al, 1991), NEO-FFI (Costa & McCrae, 1991), and SCQ-A (Copeland et al, 1995). To be eligible, participants were required to be 18 years or over, the legal smoking age in Australia. All participants were informed of the purposes of the study and assured anonymity.
Participants were also advised that they were free to withdraw from the study at any time. Informed consent was implied through the completion and return of the questionnaire to the researcher. Participants recruited through the REP returned the questionnaire via a specified drop-box located on University campus. Friends and acquaintances of the principal researcher returned the questionnaire via post.
Chapter 3: Results

3.1 Data preparation

Data was analysed using the Statistical Package for the Social Sciences (SPSS) version 12.0.1. Prior to analysis, the data was subject to preliminary examination in order to identify and remedy out-of-range values, missing data, and univariate or multivariate outliers. Initial investigation revealed that there were four cases that circled zero for all items on the SCQ-A and were consequently removed from the dataset. Although there were no out-of-range values on any variables, there was seven univariate outliers which were further than three standard deviations from their respective means. One univariate outlier was identified on the variable Cigarettes Per Day (CPD) and given that it was further than three standard deviations from the mean, it was removed. Two other outliers were still apparent in the variable CPD. However, these were not excluded as they were judged to reflect actual characteristics of the distribution, and left in their original form (Hair, Anderson, Tatham & Black, 1998). Four univariate outliers further than three standard deviations from the mean existed for the smoking expectancy variable, Health Risks. These cases were removed from further analysis. An examination of the prevalence of missing data revealed no case with more than 30% of values missing on any scale. In instances where less than 30% of values contributed to a specific subscale were missing, a person mean substitution approach was used in which the case average for the remaining subscale items were imputed as replacement values (Hawthorne & Elliot, 2004). Multivariate outliers were assessed separately for CPD and FTND against all personality traits and smoking expectancies, in order to take into account any possible
unusual combinations of the predictors, not evident by looking at each variable individually. Assessment of multivariate outliers required evaluation of the maximum Mahalanobis distance value separately for CPD and FTND and all predictors. There was no suggestion of multivariate outliers for CPD and any predictors, where Mahalanobis distance (28.17) was well below the critical value (39.25). Furthermore there was no suggestion of multivariate outliers for FTND and any predictors, where Mahalanobis distance (28.37) was also well below the critical value (39.25; Tabachnick & Fidell, 2001).

3.2 Descriptive analysis

Data was then examined for deviations from normality. This process involved the production of statistics and graphical representations of the data (e.g., normality statistics, histograms). The analysis demonstrated that a large number of research variables were not normally distributed, as confirmed by examination of the Shapiro-Wilks statistic. The variable CPD (Shapiro-Wilks (58) = .93, p<.01) and FTND (Shapiro-Wilks (58) = .88, p<.001) had severe departures from normality. In both cases the data was positively skewed (see Table 1 for skewness statistic). With regards to the FFM personality traits, E (Shapiro-Wilks (151) = .98, p<.05) and O (Shapiro-Wilks (151) = .98, p<.05) were found to deviate from normality (see Table 1 for skewness statistic). All ten smoking expectancies were confirmed to depart from normality by examination of Shapiro-Wilks statistics (Shapiro-Wilks (151) ranged from .74 - .95, p <.01; see Table 1 for skewness statistic). As outlined below (section 3.3) the analytical approach of this
study, ordinal logistic regression is robust to violations of normality (Tabachnick & Fidell, 2001).

Cronbach’s alpha coefficients were calculated to assess the internal consistency of the scales used in the present study. All the scales used in this study demonstrated acceptable levels of internal consistency of values $\geq .70$ (Joe, Broome, Rowan-Szal & Simpson, 2002). The reliabilities for each of the scales are shown in Table 1 along with the means, standard deviations, range, skewness statistic, and published means.
Table 1
*Means, Standard Deviations and Internal Consistency Coefficients for Smoking Behaviour, Level of Nicotine Dependence, Personality and Smoking Outcome Expectancies*

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>α</th>
<th>Theoretical Range</th>
<th>Observed Range</th>
<th>Published Means</th>
<th>Skewness Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPD (full sample)</td>
<td>151</td>
<td>3.53</td>
<td>6.00</td>
<td>-</td>
<td>0-30</td>
<td>0-47</td>
<td>17.80</td>
<td>(1) .27</td>
</tr>
<tr>
<td>N</td>
<td>151</td>
<td>23.40</td>
<td>8.12</td>
<td>0.87</td>
<td>0-48</td>
<td>0-47</td>
<td>17.80</td>
<td>(1) .27</td>
</tr>
<tr>
<td>E</td>
<td>151</td>
<td>30.16</td>
<td>6.40</td>
<td>0.82</td>
<td>0-48</td>
<td>6-44</td>
<td>28.30</td>
<td>.50</td>
</tr>
<tr>
<td>O</td>
<td>151</td>
<td>28.93</td>
<td>5.98</td>
<td>0.73</td>
<td>0-48</td>
<td>11-43</td>
<td>28.70</td>
<td>.03</td>
</tr>
<tr>
<td>A</td>
<td>151</td>
<td>30.44</td>
<td>5.66</td>
<td>0.74</td>
<td>0-48</td>
<td>11-43</td>
<td>32.60</td>
<td>.28</td>
</tr>
<tr>
<td>C</td>
<td>151</td>
<td>28.53</td>
<td>6.24</td>
<td>0.80</td>
<td>0-48</td>
<td>10-46</td>
<td>34.10</td>
<td>.99</td>
</tr>
<tr>
<td>Negative Affect Reduction</td>
<td>151</td>
<td>36.59</td>
<td>25.70</td>
<td>0.98</td>
<td>0-81</td>
<td>0-81</td>
<td>50.50</td>
<td>(2) .07</td>
</tr>
<tr>
<td>Stimulation-State Enhancement</td>
<td>151</td>
<td>13.05</td>
<td>11.57</td>
<td>0.89</td>
<td>0-54</td>
<td>0-45</td>
<td>23.34</td>
<td>.56</td>
</tr>
<tr>
<td>Health Risks</td>
<td>151</td>
<td>32.18</td>
<td>5.43</td>
<td>0.70</td>
<td>0-36</td>
<td>9-36</td>
<td>31.12</td>
<td>-.19</td>
</tr>
</tbody>
</table>

| CPD (smokers)             | 58 | 9.28 | 6.40| -    | 0.5-30             | 12.30          | .5-30           | (3)                |
| FTND                      | 58 | 2.57 | 2.00| 0.72 | 0-10              | 0-8            | 2.80           | (4)                |

Note: CPD = Cigarettes Per Day, FTND = Fagerstrom Test of Nicotine Dependence
2. Nicotine and Tobacco research, 2005
As can be seen in Table 1, the means on smoking behaviour, personality and smoking outcome expectancies were generally comparable to the equivalent published mean. However, there are some differences worth noting, for example this sample tends to be slightly higher on N and lower on E and C. However, this was comparable to student samples (Marcus & Schutz, 2005).

This study explored age and gender differences comparative to previous research. Analysis of Variance (ANOVA) revealed, consistent with previous research (John, Meyer & Hapke, 2003), significant differences in age with smoking status were found, older subjects tended to smoke more heavily. More specifically there were significant differences in age between non-smokers ($M=21.79, SD=8.13$), light ($M=24.70, SD=9.57$), moderate ($M=25.67, SD=5.42$) and heavy smokers ($M=29.83, SD=11.44$), Estimate=.05, 95% CI: .01,.09, Wald=7.18, p<.01. Crosstabulation revealed that consistent with previous findings (Durkin, Germain, Letcher & Lipscomb, 2005), no significant difference in smoking status according to gender ($\chi^2 (3) = 4.67, p >.05$). In addition and consistent with previous research (see Costa, Terracciano & McCrae, 2001), ANOVA revealed that females scored higher on N ($F(1,137) = 9.02, p<.01$) and A ($F(1,137) = 4.53, p<.05$) than males.

3.3 Data reduction and analysis

Under the categorisation of smoking status, 62% of participants were non-smokers, 26% were light smokers, 8% moderate smokers and 4% were heavy smokers.
Given that the dependent variable was an ordinal measure of smoking behaviour, the primarily analytic approach was ordinal logistic regression. Ordinal logistic regression has no assumptions about the distribution of the predictor variables. However it does assume that the response categories are ordinal. Smoking status categories were considered ordinal and thus this assumption was assumed (Tabachnick & Fidell, 2001). Furthermore, ordinal logistic regression assumes that all variables meet the proportional odds/parallel lines assumption. The test of parallel lines determines whether it is reasonable to assume that the values of the location parameters (slope coefficients) are constant across categories of the response (Tabachnick & Fidell, 2001). However, ordinal logistic regression has been found to be robust to this assumption (Williams, 2005).

### 3.4 Personality predictors of smoking behaviour

The means and standard deviations for the five personality traits across smoking status are displayed in Table 2 below.

<p>| Table 2 |
| Mean and Standard Deviations of Personality Traits Across Smoking Status |
|-------------------|-------------------|-------------------|-------------------|-------------------|</p>
<table>
<thead>
<tr>
<th></th>
<th>Non-Smoker</th>
<th>Light Smoker</th>
<th>Moderate Smoker</th>
<th>Heavy Smoker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroticism</td>
<td>22.86</td>
<td>23.77</td>
<td>25.81</td>
<td>24.17</td>
</tr>
<tr>
<td>Extraversion</td>
<td>30.37</td>
<td>29.97</td>
<td>28.67</td>
<td>30.50</td>
</tr>
<tr>
<td>Openness</td>
<td>28.87</td>
<td>29.03</td>
<td>28.15</td>
<td>29.33</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>31.21</td>
<td>29.82</td>
<td>27.93</td>
<td>26.50</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>28.18</td>
<td>28.83</td>
<td>29.29</td>
<td>30.83</td>
</tr>
</tbody>
</table>

As can be seen from Table 2, levels of N were generally higher for people in the higher categories of smoking. However levels of E tended not to differ much across
smoking status categories. The mean scores of C increased from each category of smoking status from non-smoker to heavy smoker.

Ordinal logistic regression was conducted to examine if the differences in mean personality score across smoking status (see Table 2) were significant. Results from the analysis are presented in Table 3 below.

Table 3
*Estimate's, 95% Confidence Intervals, Wald statistic's and Significance For Personality Traits Across Smoking Status*

<table>
<thead>
<tr>
<th>Personality Trait</th>
<th>Estimate</th>
<th>95% CI Lower</th>
<th>95% CI Upper</th>
<th>Wald</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroticism</td>
<td>.02</td>
<td>-.03</td>
<td>.07</td>
<td>.82</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Extraversion</td>
<td>.01</td>
<td>-.05</td>
<td>.07</td>
<td>.12</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Openness</td>
<td>.01</td>
<td>-.04</td>
<td>.07</td>
<td>.22</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>-.09</td>
<td>-.15</td>
<td>-.02</td>
<td>6.84</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>.05</td>
<td>-.01</td>
<td>.11</td>
<td>3.13</td>
<td>&gt;.05</td>
</tr>
</tbody>
</table>

Note: CI = Confidence interval (df = 1)

As can be seen in Table 3, ordinal logistic regression revealed that only the personality trait A was significantly associated with smoking status. Specifically, higher levels of A were associated with decreased probability of being in the higher categories of smoking status (see Table 2).

3.4.1 Mediational models

The first criterion for mediation of the expectancy Stimulation-Sate Enhancement in the relationship between E and smoking behaviour was not met, where as mentioned above E was not related to smoking status (Path A; see section 1.4.2). In
addition, the first criterion for mediation of the expectancy Negative Affect Reduction in the relationship between N and smoking behaviour was not met, where as mentioned above N was not related to smoking status (Path A; see section 1.4.3).

3.5 Smoking outcome expectancy predictors of smoking behaviour

The means and standard deviations of smoking outcome expectancies across smoking status categories are demonstrated in Table 4 below.

<table>
<thead>
<tr>
<th></th>
<th>Non-Smoker</th>
<th>Light Smoker</th>
<th>Moderate Smoker</th>
<th>Heavy Smoker</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Negative Affect Reduction</strong></td>
<td>25.31</td>
<td>53.79</td>
<td>58.45</td>
<td>62.33</td>
</tr>
<tr>
<td><strong>Stimulation-State Enhancement</strong></td>
<td>9.55</td>
<td>19.51</td>
<td>17.42</td>
<td>21.17</td>
</tr>
<tr>
<td><strong>Health Risks</strong></td>
<td>31.43</td>
<td>33.33</td>
<td>32.92</td>
<td>34.33</td>
</tr>
</tbody>
</table>

As shown in Table 4, the mean level of Negative Affect Reduction increased across smoking status categories from non-smoker to heavy smoker. In addition, the mean level of Stimulation-State Enhancement generally increased across smoking status categories.

Ordinal logistic regression was conducted to examine whether the differences in smoking expectancy levels across smoking status categories were significant. Results from the analysis are presented in Table 5 below.
Table 5

*Estimate's, 95% Confidence Intervals, Wald statistic's and Significance For Smoking Outcome Expectancies Across Smoking Status*

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>95% CI</th>
<th>Wald</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td>Negative affect reduction</td>
<td>.06</td>
<td>.02</td>
<td>.09</td>
<td>11.80</td>
</tr>
<tr>
<td>Stimulation state enhancement</td>
<td>-.01</td>
<td>-.06</td>
<td>.04</td>
<td>.14</td>
</tr>
<tr>
<td>Health risks</td>
<td>.08</td>
<td>-.02</td>
<td>.17</td>
<td>2.68</td>
</tr>
</tbody>
</table>

*Note* CI = Confidence interval (df = 1)

As can be seen in Table 5, ordinal logistic regression revealed that consistent the outcome expectancy Negative Affect Reduction differed significantly by smoking status. Specifically, higher levels of Negative Affect Reduction expectancy were associated with increased probability of being in the higher categories of smoking status. However, the expectancy of Stimulation-State Enhancement was not significantly associated with smoking status.

3.6 Personality and smoking outcome expectancies

In order to examine the relationship between N and E, and the expectancies of Negative Affect Reduction and Stimulation-State Enhancement respectively, correlations between the variables were conducted. They are shown in Table 6 below.
As can be seen from Table 6, N was positively correlated with the expectancy Negative Affect Reduction. This correlation was weak to moderate and significant. The trait E was not positively associated with the expectancy Stimulation-State Enhancement. Instead, there was a weak negative correlation between E and Stimulation-State Enhancement, which was not significant.

### 3.7 Moderation test: Expectancy of Health Risks, C and Smoking Behaviour

This study explored whether the smoking expectancy of Health Risks interacts with the personality trait C in the relationship with smoking behaviour. The moderation analysis followed the procedure recommended by Baron & Kenny (1986). They propose that if the interaction between the predictor (conscientiousness) and moderator (Health risks) is significant, then there is evidence of moderation. In accordance with the guidelines proposed by Tabachnick and Fidell (2001), the variables C and expectancy Health Risks were centred and an interaction term was computed. In preparation for analysis, the interaction term of C by Health Risks was assessed for deviations of
normality and univariate and multivariate outliers. Thus interaction term was not normally distributed as identified by Shapiro-Wilks statistic, \( p < .001 \). Subsequently the interaction term was assessed for outliers. Stem-and-leaf plots revealed two univariate outliers that were at least three standard deviations away from the mean. Ordinal logistic regression was conducted with inclusion and exclusion of univariate outliers.

Furthermore, there were found to be three multivariate outliers indicated by the maximum mahalanobis distance (29.58), which was above the critical value (16.27) (Tabachnick & Fidell, 2001). Ordinal logistic regression was additionally conducted without the multivariate outliers. Ordinal logistic regression was firstly conducted for the moderation test of the expectancy health risks without exclusion of univariate and multivariate outliers, and results are presented in Table 7 below.

Table 7

<table>
<thead>
<tr>
<th></th>
<th>Estimate</th>
<th>95% CI</th>
<th>Wald</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
<td></td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>.03</td>
<td>-.03</td>
<td>.08</td>
<td>.94</td>
</tr>
<tr>
<td>Expectancy Health Risks</td>
<td>.07</td>
<td>.00</td>
<td>.15</td>
<td>3.99</td>
</tr>
<tr>
<td>Interaction term (C x health risks)</td>
<td>.00</td>
<td>-.02</td>
<td>.01</td>
<td>.22</td>
</tr>
</tbody>
</table>

Note CI = Confidence interval (df = 1)

As shown in Table 7, the trait C was not significantly related to smoking status whilst the expectation of Health Risks was significantly related to smoking status. The interaction between C and the expectancy Health Risks was not significantly related to smoking status. These findings were not affected by removal of the univariate or multivariate outliers (see Appendix C).
3.8 Dependence and smoking behaviour

It was hypothesised that nicotine dependence as measured by the FTND, would positively predict smoking status. Given that the variable CPD was item four on the FTND (see section 2.4) ordinal logistic regression was conducted both with and without this item. However, removal of the item reduced the internal reliability of the scale below the recommended .70 (Joe et al, 2002) and therefore analysis with the item included are reported here (see Appendix C for results excluding the item).

3.8.1 The subgroup of smokers (n = 58)

The subgroups of smokers included light, moderate and heavy smokers. Ordinal logistic regression was conducted to examine the hypothesis that nicotine dependence would positively predict smoking status. Heavy smokers (M=5.67, SD=1.75) tended to score higher on the FTND than moderate smokers (M=4.67, SD=1.15) followed by light smokers (M=1.51, SD=1.00). This difference in mean score across the subgroup of smokers was significant (Estimate = 1.61, 95% CI: .92, 2.31, Wald (1) = 20.67, p<.001).

3.8.2 Inclusion of non-smokers (N = 151)

A post hoc analysis was conducted to explore and extend on the use of the FTND as applied to smokers by assuming that non-smokers could be assigned a dependence score of zero. This enabled examination of the relationship between nicotine dependence and smoking behaviour for the full sample. Internal reliability of the FTND with inclusion of non-smokers was .77. Ordinal logistic regression revealed that there was a significant difference in nicotine dependence across smoking status including non-smokers and light, moderate and heavy smokers (Estimate = 3.43, 95% CI: .2.43, 4.44, Wald (1) = 45.10, p<.001).
Chapter 4: Discussion

4.1 Overview of aims and findings

The overall aim of the present study was to explore people’s motivation’s to smoke, primarily focusing on the impact of personality and smoking outcome expectancies on smoking behaviour. More specifically this study aimed to investigate the relationship between N and smoking behaviour as mediated by the outcome expectancy of Negative Affect Reduction. Additionally, this study aimed to investigate the relationship between E and smoking behaviour as mediated by the outcome expectancy of Stimulation-State Enhancement. This study also explored whether C moderated the relationship between the expectancy of Health Risks and smoking behaviour. Furthermore, a final focus of this study was the relationship between nicotine dependence and smoking behaviour. This study’s results will now be outlined and interpreted.

4.2 Personality and smoking behaviour

Contrary to expectation no relationship was found between N and smoking behaviour. This finding was inconsistent with previous research which has found N to relate positively to smoking behaviour (Jeanne et al, 2005; Terraciano & Costa, 2004). This current finding was also inconsistent with theories of affect regulation in which high levels of N motivate smoking behaviour to reduce anxiety levels (Lujie et al, 2005).
Also contrary to hypothesis, no relationship was found between E and smoking behaviour. This finding was again inconsistent with previous research which identifies E as relating positively to smoking behaviour (Jeanne et al, 2005), and arousal modulation models where high levels of E motivate the behaviour of ‘stimulation smoking’ for the arousal effect (Lujic et al, 2005).

Contrary to hypothesis no relationship was found between C and smoking behaviour. This finding was inconsistent with previous research, which identified the trait C relating negatively to smoking behaviour (Terraciano & Costa, 2004). Furthermore the current finding was inconsistent with the notion people low on C would tend to smoke more because of their reduced ability to control their urges to smoke (Vollrath & Torgersen, 2002: 1194).

Unexpectedly this study found a significant negative association between the personality trait A and smoking status. Higher levels of A were associated with decreased likelihood of being in the heavier smoking categories. This was partially coherent with previous research, which shows inconsistencies in the relationship between A and smoking behaviour (McCann, 2005; Shinner, 2000).

This study proposes two plausible explanations for the findings on the relationship between personality and smoking behaviour. Each will be discussed in turn. The first explanation clarify’s the lack of support for predicted relationships between personality and smoking behaviour as possibly due to the different stage of smoking behaviour assessed in this study comparative to previous research. Previous
research has explored the relationship between personality and the initiation of smoking behaviour. Such studies have found that the personality traits of N, E and C were associated with why people begin to smoke (Luijic et al, 2005). It was subsequently proposed by Lujic et al. (2005) that personality factors were responsible for the initiation of smoking behaviour. Divergently, this study assessed the relationship between personality and the maintenance of smoking behaviour. This study may have not found a relationship between the personality traits N, E and C and smoking because personality may not predict why people maintain the behaviour. The disparity between the stages of smoking assessed in this study comparative to previous research may therefore explain the lack of predicted relationships between personality and smoking behaviour. This was because the empirical underpinnings of this study relative to personality were derived from previous research assessing the initiation of smoking and were unsuitably assumed to apply to the maintenance of the behaviour. However this may be considered largely debatable where personality has been found to relate to the maintenance of smoking (Terraccion & Costa, 2004) and may require further investigation.

The second explanation provides interpretation of the relationship between personality and smoking in this study as reflecting rapid cultural change. This explanation clarify’s the lack of a relationship between the personality traits N, E and C and smoking behaviour, and also provides insight into the negative association found between A and smoking. Research on the relationship between personality and smoking was conducted a number of years ago (Terraccino & Costa, 2004) and
cultural attitudes towards smoking have changed since then (Encyclopedia Britannica, 2006). Smoking was once an accepted norm and has become increasingly associated with negative connotations such as harmful to self and others (e.g. passive smoking) (Encyclopedia Britannica, 2006; see section 1.2.2). Thus many people are opting to quit the behaviour as reflected in decreased prevalence (Hill & Carroll, 2003). The predicted personality traits of N, E and C subsequently no longer reflect motive to smoke, because cultural connotations of smoking as harmful to your health encourages people not to engage in smoking regardless of its ability to decrease their anxiety or increase stimulation. The people who are likely to smoke may therefore tend to resist societal regulations or who are out of touch with societal perceptions. The trait A has been found to be associated with both resisting societal regulations and low social interaction (McAdams, 2001). People low on A may therefore smoke more because they may resist societal regulations or are out of touch with the cultural negative connotations attached to smoking as harmful to your health. Differences between our findings and the literature may therefore represent real change in the relationship between personality and smoking as a result of rapid cultural transformation.

4.3 Smoking outcome expectancies and smoking behaviour

The hypothesis that the expectancy of Negative Affect Reduction would be positively associated with smoking behaviour was supported. The expectancy of Negative Affect Reduction was significantly related to smoking status: higher levels
of the expectancy were associated with increased likelihood of being in the heavier smoking categories. This was consistent with previous research and the corresponding theory that people tend to smoke more the higher their level of anticipation that smoking would reduce feelings of anxiety or tension (Cohen et al, 2002, Jeffries et al, 2004).

The hypothesis that the expectancy Stimulation-State Enhancement would be positively associated with smoking behaviour was partially supported. Consistent with previous research (Cohen et al, 2001; Jeffries et al, 2004) higher levels of the expectancy of Stimulation-State Enhancement were associated with increased likelihood of being in the heavier smoking categories. However this was not significant.

A plausible explanation for the relationship found between the two predicted smoking outcome expectancies and smoking behaviour, relates to the possibility that Negative Affect Reduction may be a stronger predictor of smoking behaviour than Stimulation-State Enhancement. Furthermore, that the expectancy of Stimulation-State Enhancement may not be as powerful a predictor of smoking as previously thought (Cohen et al, 2001). Whilst the two expectancies were associated to smoking behaviour in the predicted direction, the expectancy Negative Affect Reduction was a stronger predictor than Stimulation-State Enhancement. Consistent with this explanation, Parrott (1998) cited in Luijic et al. (2005), found that the reduction of stress experienced during smoking was a more powerful motive than the induction of positive feelings. Furthermore, Copeland et al (1995) found that the expectation of
Negative Affect Reduction was more strongly associated to smoking than the expectancy of Stimulation-State Enhancement. It may be possible that the anticipation of reduced stress was a stronger predictor of smoking behaviour than the anticipation that smoking would increase stimulation, and subsequently was reflected in the current findings. Further consideration may be required regarding the possibility that the expectation of stimulation may not be as powerful a predictor of smoking as previously suggested (Jeffries et al, 2004).

4.4 Personality and smoking outcome expectancies

As expected, there was a significant positive relationship between the personality trait N and the expectancy of Negative Affect Reduction. Contrary to prediction however, there was no significant relationship between the trait E and the expectancy Stimulation-State Enhancement. These findings will now be interpreted relative to the pharmacological effects of nicotine.

Nicotine has a biphasic action on the central nervous system, where in low doses it has been found to increase arousal and in higher concentrations decreases arousal (Lujic et al, 2005; see section 1.2). The pharmacological effects of nicotine have been further linked to the traits N and E. Eysenck (1980) argued that people high on the personality trait of N smoke to reduce anxiety and tension. Findings from this study support this notion, suggesting that high levels of N relate to increased expectation that smoking would reduce anxiety. Eysenck (1980) also argued that people high on the personality trait of E smoke in search for stimulation. Findings
from this study, however, did not support this notion, given that no relationship was found between the trait E and the expectancy Stimulation-State Enhancement.

As described above (section 4.3), it may be possible that results reflect that the reduction of stress experienced during smoking may be a more powerful motive than the induction of positive feelings. Furthermore, that people high on E do not have high expectations of Stimulation-State Enhancement, as could be theoretically envisaged.

It is important to note that the relationship between personality and smoking outcome expectancies has been largely unexplored. This study was the first to specifically investigate the relationship between the big five personality traits and smoking outcome expectancies. Therefore further investigation may be required to gain a comprehensive account of the relationship between personality and smoking outcome expectancies.

4.5 Personality, smoking outcome expectancies and smoking behaviour

Findings in relation to the complex relationship between personality, smoking outcome expectancies, and smoking behaviour will now be discussed.

4.5.1 Mediation test

It was hypothesised that the expectancy of Negative Affect Reduction would mediate the relationship between N and smoking behaviour. The first criterion for this mediational hypothesis requires the personality trait N to be significantly related to
smoking status (Path C; see Figure 1 section 1.4.2). As mentioned above, this criterion was not met and thus this mediational hypothesis was not supported.

It was also hypothesised that the positive expectancy of Stimulation-State Enhancement would mediate the relationship between E and smoking behaviour. The first criterion for this model requires E to be significantly related to smoking status (Path C; see Figure 2 section 1.4.3). This criterion was not met and thus this mediational hypothesis was not supported.

The mediational models in this study were drawn from the idea that more proximal cognitive variables (expectancies) might mediate the relationship between personality traits and smoking behaviour. This notion was derived from the ‘acquired preparedness model’, which has been applied to alcohol consumption (McCarthy et al, 2001). The lack of support for the mediational models in this study encourage consideration of what might be different between alcohol and smoking behaviours. Whilst previous research shows smoking and alcohol behaviour to be highly correlated (Laws, 1990; Paavola, Vartiainen & Haukkala, 2004), there may be differences that provide a possible explanation for the lack of support for the mediation of expectancies in the relationship between personality and smoking behaviour.
4.5.2 Moderation test

This study explored whether C moderated the relationship between the expectancy of Health Risks and smoking behaviour. The moderation test was found to be not significant. More specifically, the interaction between C and the expectancy Health Risks was not related to smoking behaviour. This study was the first to attempt to explain the lack of a relationship between the expectancy Health Risks and smoking behaviour (Jeffries et al., 2004), as related to personality. More specifically, whether the lack of an association in previous research between the expectancy Health Risks and smoking behaviour depends on low/high levels of C. This notion was however not supported.

The moderational model was an exploratory investigation, and results suggest that people may be motivated to continue to smoke despite being aware of the health consequences, for other reasons that were not tested in the moderational model.

Whilst it may be possible that findings reflect the ‘real’ relationship in the population, a possible explanation for the lack of an association refers to the sample, which was largely students (see section 2.1). More specifically, the tendency for student samples to be low on the trait C. For example, the published mean for the trait C was 34.10 (see section 3.2; Murray et al., 1998). However, in this study and consistent with previous research with a student sample (Marcus & Schutz, 2005), the mean level of C was found to be lower at 28.53 (see section 3.2). This may have impacted on results because the strength of the relationship between smoking and C (due to low mean score) would consequently become weaker and thus the lack of a
relationship in this study may not necessarily reflect that one does not exist in the population.

4.6 Dependence and smoking behaviour

As expected, nicotine dependence was significantly related to smoking behaviour, whereby heavier smokers were found to be more dependent on cigarettes. This finding is consistent with previous research, which demonstrates a positive relationship between smoking behaviour and nicotine dependence (Storr et al, 2005, Lujic et al, 2005).

The significant relationship between the FTND and smoking status was unaffected by the inclusion of non-smokers in post hoc analysis, where they were assumed a score of zero on the FTND. Furthermore, Internal reliability with inclusion of non-smokers was comparable to that excluding non-smokers (see section 3.7). Findings were consistent with previous research by Vink (2005) who found that the FTND was applicable to non-smokers as well as smokers. Vink (2005) concluded that the FTND was a valuable tool that could be useful with large epidemiological samples. This study supported this notion by the relationship found between dependence and smoking in the full sample.
4.7 Theoretical and practical implications

One of the theoretical implications arising from this study is with respect to personality and smoking. Previous research has demonstrated a link between N, E and C and smoking behaviour (Jeanne et al, 2005; Terraciano & Costa, 2004). However results from this study suggest that these personality traits are not as important predictors of smoking motivation as previously thought. It may be that people nowadays no longer resort to smoking to regulate anxiety, stimulate mood or because the may not be able to control their urges to smoke.

A second theoretical implication of the present study is with respect to the more proximal variable of smoking outcome expectancies and smoking behaviour. Results from this study suggest that the expectancy that smoking would reduce negative affect influences motive to smoke, whilst the expectancy of increased stimulation does not. This suggests that the motive to smoke for the effects of reduced anxiety may be stronger than the motive for stimulation. Furthermore this study suggests that the motive of ‘stimulation smoking’ may not be as strong a predictor of smoking behaviour as previously thought.

A practical implication of the present study is related to the recent shift in cultural perceptions on smoking (Encyclopedia Britannica, 2006), which has meant that the focus of prevention and cessation programs need to be aimed at engaging people who are unaware or resistant to the connotations that smoking is harmful to your health. People who tend not to be aware of societal perceptions or resist cultural regulations tend to be those low on A, whom were found in previous studies to have a
shortage of social skills (Shinner, 2000). Increasing social skills may aid cultural awareness of negative connotations regarding smoking as harmful, and subsequently decrease smoking behaviour. Thus implications for this study are suggestive of social-skills training programs. Previous research has found that social-skills training programs in drug prevention were highly effective in U.S.A (Botvin et al, 2002). This could perhaps be applied to smoking in Australia.

Separate from personality and smoking outcome expectancies, results on the physiological aspect of dependence also have implications. For example this study found that consistent with previous research (Storr et al, 2005), the physiological addictive properties of nicotine motivate people to maintain their smoking behaviour. Thus this study suggests that nicotine dependence requires attention in smoking cessation programs, because the physiological affects of smoking may be a barrier to quitting the behaviour.

Another implication of this study refers to the extension of the FTND. This study demonstrated that the FTND could be applied to a sample of smokers and non-smokers by assuming non-smokers a score of zero on nicotine dependence. Thus this study implicates that the FTND may be a functional measure that can be extended beyond just a smoking sample.
4.8 Current limitations and directions for future research

There are a number of limitations of this study worth consideration. The first refers to small sample size. As with all statistical techniques, power increases with sample size (Tabachnick & Fidell, 2001). Comparative to previous research (Copeland et al, 1995; Jeffries et al, 2004), this study had a substantially reduced sample size, which may explain the evident lack of significant relationships between predicted variables, thus limiting the study. In addition, this study was limited by the largely student sample due to the recruitment of undergraduate psychology students through the REP. This may limit the extent to which results from this study can be generalised to the broader population. Furthermore, the present study was designed to investigate the association between variables, and therefore casual inferences regarding the relationships could not be made. Lastly, a further limitation of this study was the low reliability of the FTND, when item four on CPD was excluded. Consequently, the reliability of the relationship between smoking and the FTND was reduced when controlling for the possible artificial inflation of results.

Future research addressing these limitations is warranted. For example the relationship between personality, smoking outcome expectancies and smoking behaviour could be examined in a larger sample inclusive of a more representative population, to see if the proposed mediational and moderational models of smoking motivation become evident. Furthermore, future research can extend on the findings of this study in a number of ways. For example, by exploring possible alternate explanations regarding why people smoke even though they expect smoking would
lead to health risks. It would also be of interest to examine the unexpected relationship found between A and smoking relative to cultural change on perceptions of smoking. A further direction of future research may also be to more fully explore personality and expectancies relative to different stages of smoking such as the initiation and cessation of the behaviour, to see if there are different motives operating at various stages of the behaviour. It may be the case that different motives are important to consider in smoking prevention and other motives are relevant to consider in stopping the habit.

4.9 Conclusion

In conclusion, it was hoped that this project would contribute to the body of research investigating motivation to smoke. This study focused on the complex relationship between personality, smoking outcome expectancies, and smoking behaviour. Contrary to hypothesis the predicted personality traits of N, E and C were found not to relate to smoking. As predicted, there was a significant association between the expectancy Negative Affect Reduction and smoking behaviour. However contrary to hypothesis, there was no significant relationship found between the expectancy of Stimulation-State Enhancement and smoking behaviour. As expected, there was a positive relationship between N and the expectancy Negative Affect Reduction. Contrary to expectation, however, no relationship was found between E and the expectancy Stimulation-State Enhancement. As no relationship was found between N and smoking behaviour, the first criterion for the mediational hypothesis
of the expectancy Negative Affect Reduction in the relationship between N and smoking was not met. Therefore this mediational hypothesis was not supported. As no relationship was found between E and smoking behaviour, the first criterion for the mediational hypothesis of the expectancy Stimulation-State Enhancement in the relationship between N and smoking was not met. Thus this hypothesis was not supported. It was found that C did not moderate the relationship between the expectancy of Health Risks and smoking behaviour. Lastly and as predicted, there was a positive relationship between nicotine dependence and smoking. Post hoc analysis revealed that this was unaffected by the inclusion of non-smokers.

Despite the lack of evidence for a number of proposed hypothesis and limitations, the current study has implications for both professional practice and psychological research. This study indicates that individual difference variables and cognitive expectancies related to smoking behaviour may not be as powerful predictors of smoking motivation as previously thought (Terracciano & Costa, 2004). Recent cultural change on perception of smoking has meant that people who resist the negative connotations of smoking as harmful, or are out of touch with society, are the people who are likely to smoke more. Such people tend to be those low on A, and thus this study found that people low on A tend to smoke more. Consequently, this study suggests social-skills training as a preventative program to reduce smoking behaviour in Australia. Lastly, this study shows nicotine dependence to be a strong motive of smoking behaviour, which additionally has implications for smoking cessation programs.
References


Lewis, S.J., Cherry, N.M., Niven, R.M., Barber, P.V., Wilde, K., & Povey, A.C. (2003). Cotinine levels and self-reported smoking status in patients attending a bronchoscopy clinic. *Biomarkers, 8* (3-4), 218 – 228.


Appendix A

Complete copy of questionnaire
Appendix B

Copy of FTND

1. How soon after waking do you have your first cigarette?
   a) Within 5 minutes
   b) 6-30 minutes
   c) 31-60 minutes

2. Do you find it difficult to abstain from smoking in places where it is forbidden?
   a) Yes
   b) No

3. Which cigarette would you hate to give up?
   a) The first in the morning
   b) Any other

4. How many cigarettes a day do you smoke?
   a) 10 or less
   b) 11-20
   c) 21-30
   d) 31 or more

5. Do you smoke more frequently in the morning than the rest of the day?
   a) Yes
   b) No

6. Do you smoke even though you are sick in bed for most of the day?
   a) Yes
   b) No
Appendix C

Additional statistics
Table 8
Estimates, 95% Confidence Intervals, Wald Statistic and Significance For Moderation of Expectancy Health Risks Excluding of Univariate Outliers

<table>
<thead>
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<th>Estimate</th>
<th>95% CI</th>
<th>Wald</th>
<th>Sig</th>
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<td>Upper</td>
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<tr>
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<td>.14</td>
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<tr>
<td>Interaction term (C x Health Risks)</td>
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<td>-.02</td>
<td>.01</td>
<td>.53</td>
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</tbody>
</table>

Note CI = Confidence interval (df = 1)

Table 9
Estimates, 95% Confidence Intervals, Wald Statistic and Significance For Moderation of Expectancy Health Risks Excluding of Multivariate Outliers

<table>
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<th>Estimate</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
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<tr>
<td>Interaction term (C x Health Risks)</td>
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<td>.02</td>
<td>.04</td>
</tr>
</tbody>
</table>

Note CI = Confidence interval (df = 1)
Dependence and smoking behaviour: excluding item number four on the FTND relating to CPD.

The subgroup of smokers (n = 58)

Heavy smokers (M=4.33, SD=1.37) tended to score higher on the FTND than moderate smokers (M=3.67, SD=1.15), followed by light smokers (M=1.68, SD=.94). This difference in mean score across the subgroup of smokers was significant (Estimate = 1.37, 95% CI: .76, 1.98, Wald (1) = 19.27, p<.001).

Inclusion of non-smokers (N = 151)

A post hoc analysis was conducted to explore and extend on the use of the FTND as applied to smokers by assuming that non-smokers could be assigned a dependence score of zero. Ordinal logistic regression revealed that there was a significant difference in nicotine dependence across smoking status (Estimate = 3.09, 95% CI: 2.23, 3.97, Wald (1) = 47.07, p<.001).