

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

# PERSONALITY AND OTHER FACTORS ASSOCIATED WITH SMOKERS AND NON-SMOKERS

Mette Hansen-Reid

A thesis presented in partial fulfilment of the requirements for the degree of

Masters of Arts in Psychology

At Massey University, Albany,  
New Zealand

2006

***“smoking kills more people in New Zealand than the total number killed by drinking alcohol, taking drugs, murder, suicide, road crashes, air crashes, poisoning, drowning, fires, falls, lightening and electrocution”  
(Cancer Society of New Zealand, 2001a, Health effects of smoking ¶ 3)***

## ABSTRACT

The Eysenck Addiction Scale has not previously been used to measure the addictive nature of cigarette smoking. The purpose of this study was to investigate the utility of the Eysenck Addiction Scale (AS) in differentiating smokers from non-smokers, and to identify the personality factors that distinguish smokers from non-smokers. A further aim was to examine the concordance among different measures of nicotine dependence and to compare this to self-perceived nicotine dependence among cigarette smokers.

A cohort of 120 first year psychology students volunteered to complete a self-report questionnaire including demographic information, smoking behaviour and the Eysenck Personality Questionnaire-Revised (EPQ-R). The Heaviness of Smoking Index and DSM-IV-TR withdrawal criteria were used to assess nicotine dependence. Non-parametric statistics were used to test differences between the personality traits, smoking behaviour, demographic characteristics and nicotine dependence measures.

Daily smokers scored significantly higher on the Addiction Scale of the EPQ-R than non-smokers. Daily smokers also scored higher on the personality dimensions of Psychoticism and Extraversion; however, there were no significant differences between any of the smoking categories on Neuroticism.

There were no significant correlations between the three measures of dependence. It is suggested that the measures evaluate different aspects of nicotine dependence. This finding is consistent with previous research and further highlights the need to develop a level of consistency throughout the field when assessing, treating or researching nicotine dependence.

There were significant differences between smokers who considered themselves nicotine dependent and those who did not consider themselves nicotine dependent on the number of cigarettes smoked per day and their score on the addiction trait. Self perceived nicotine dependence was not correlated with the Heaviness of Smoking Index or the DSM-IV-TR Withdrawal Symptoms.

This initial study suggests that the Addiction Scale is able to distinguish smokers from non-smokers on the addiction trait. It is recommended that the additional scale be calculated when the EPQ-R is administered in order to

gather additional information on the personality factors associated with addiction.

## ACKNOWLEDGEMENTS

Many thanks to

- Dave Clarke my supervisor for his support and expertise
- my family for their patience
- the participants who agreed to complete the questionnaire in order that this study could be undertaken

## CONTENTS

Title page	i
Abstract	ii
Acknowledgements	iv
Contents	v
List of Tables	x
<b>CHAPTER ONE: INTRODUCTION</b>	<b>1</b>
<b>CHAPTER TWO: CIGARETTE SMOKING</b>	<b>4</b>
THE NEW ZEALAND SITUATION	4
Deaths Attributed to Cigarette Smoking	4
Smoking Consumption	4
Adult Smoking Prevalence – Ethnic, Economic and Gender Differences	5
Smoking Prevalence among Adolescents in New Zealand	6
Initiation and Progression to Regular Smoking among Adolescents	6
Health Risks Attributed to Cigarette Smoking	7
Health Risks Attributed to Passive Smoking	8
Cigarette Smoking and Alcohol Use	9
Smoking and Illegal Substance Use	9
Mental Health and Cigarette Smoking	10
The Financial Impact on Families of Cigarette Smoking	11
Financial Costs Associated with Cigarette Smoking in New Zealand	12
Tobacco Control History in New Zealand	13
Recent Developments in Tobacco Control	13
COMPARING NEW ZEALAND TO THE REST OF THE WORLD	14
Smoking Prevalence	14
Gender Differences in Smoking Behaviour	14

Ethnic and Socio-Economic Comparisons	15
Tobacco Control	15
POSITIVE ASPECTS OF SMOKING!	16
Summary	16
<b>CHAPTER THREE: SMOKING AND DEPENDENCE</b>	<b>18</b>
DEFINING SMOKERS	18
Inconsistencies in Variable Definition	18
Smokers Defined	19
NICOTINE	19
What is Nicotine?	19
Pharmacological Effects of Nicotine	20
Tolerance to Nicotine	20
Nicotine Withdrawal	21
NICOTINE DEPENDENCE	22
Addiction Versus Dependence	22
Defining Nicotine Dependence	23
Nicotine Dependence as Defined by DSM-IV-TR Criteria	23
DSM-IV Criteria for Nicotine Withdrawal	24
Craving	24
NON-DEPENDENT SMOKERS	25
Chippers - Non-Dependent Cigarette Smokers	25
DEPENDENT SMOKERS	26
Adolescent Nicotine Dependence	27
Adult Nicotine Dependence and Compensatory Smoking Strategies	28
THEORIES OF DEPENDENCE	28
Genetic	29

Neurobiological	29
Behavioural	30
Cognitive Learning Models	31
Biopsychosocial Model	32
Disease Model of Addiction	32
Addiction Theory – New Alternatives	33
Personality	33
Summary	34
MEASURES OF DEPENDENCE	34
Biochemical Measures	35
Lifetime Cigarette Consumption	36
Heaviness of Smoking Index (HSI)	36
DSMIV – Text Revision (2000) criteria for Nicotine Withdrawal	39
Quit Attempts	39
Cigarettes Per Day (CPD)	40
Validity of Nicotine Dependence Measures	41
Summary	42
<b>CHAPTER FOUR: PERSONALITY</b>	<b>43</b>
PERSONALITY THEORIES	43
Personality Defined	43
Three, Five or Eight Factors of Personality?	43
EYSENCK'S THEORY OF PERSONALITY	44
Personality Defined	44
Hierarchical Model of Personality	45
Extraversion-Introversion (E)	46
Neuroticism – Emotionality or Stability-Instability (N)	47
Psychoticism – Tough-Mindedness-Tender-Mindedness (P)	48
Psychometric Characteristics of the P, E and N Scales	49
Physiological Differences between E, N and P	50
Heredity and Personality	51

MEASUREMENT OF PERSONALITY	51
The Development Of The EPQ-R	52
The Cultural Validity of the EPQ-R	52
EPQ-R – Lie Scale	53
MEASUREMENT OF THE ADDICTION TRAIT	54
Eysenck Addiction Scale	54
The EPQ-R as a Research Tool	55
Summary	55
<b>CHAPTER FIVE: PERSONALITY AND SMOKING</b>	<b>57</b>
Eysenck’s Theory of Smoking	57
Smoking and Personality Traits	58
Personality Theory and Smoking – Eight Personality Types	58
Summary	59
Research Goals	59
<b>CHAPTER SIX: METHODOLOGY</b>	<b>60</b>
Participants	60
Procedure	61
Measures	62
Demographic Variables	62
Smoking Characteristics	63
Nicotine Dependence Measures	63
Eysenck Addiction Scale	65
Statistical Analysis	66
<b>CHAPTER SEVEN: RESULTS</b>	<b>67</b>
Participants’ Characteristics	67
Differentiating Smokers and Non-smokers on the Addiction Scale	71
Personality Traits and Smoking Status	72
Concordance of Measures	72
Self-Perceived Dependence Compared to Dependence Measures	73

<b>CHAPTER EIGHT: DISCUSSION</b>	76	
Participant Characteristics	76	
Utility of the Eysenck Addiction Scale	77	
Personality Traits and Smoking Status	78	
Concordance of Dependence Measures	80	
Self-Perceived Dependence Compared to Dependence Measures	81	
Prevention Preferable to Treatment	81	
Limitations	82	
Future Recommendations	83	
Implications	83	
Conclusions	84	
<b>REFERENCES</b>	86	
<b>APPENDICES</b>		
Appendix A	Information Sheet /Consent Form	97
Appendix B	Questionnaire	98
Appendix C	Feedback to participants	101

**TABLES**

Table 1	Participant Characteristics	61
Table 2	Heaviness of Smoking Index	64
Table 3	Kruskal-Wallis Tests of Differences between Mean Ranks of Smoking History and Smoking Status	68
Table 4	Mann-Whitney <i>U</i> Tests of Differences between Mean Ranks of Smoking History and Gender	69
Table 5	Mann-Whitney <i>U</i> Tests of Differences between Mean Ranks of Smoking, Personality and Nicotine Dependence by Income	70
Table 6	Kruskal-Wallis Tests of Differences between Mean Ranks of Personality Trait Scores, the Heaviness of Smoking Index, and DSM-IV Symptoms for Smoking Status Groups	71
Table 7	Correlations among Dependence Measures and Smoking Variables using Spearman's rho	73
Table 8	Mann-Whitney <i>U</i> Tests of Differences between Mean Ranks of Smoking Characteristics, Personality and Self-Perceived Nicotine Dependence among Daily, Occasional and Former Smokers	74
Table 9	Mann-Whitney <i>U</i> Tests of Differences between Mean Ranks of Self-Perceived Nicotine Dependence among Smokers and Nicotine Dependence Measures	75

# Chapter One

## INTRODUCTION

The recent introduction of the 'Smoke Free Environments Act (2003) has made the public of New Zealand more aware of their right to a smoke-free environment. When the legislation was first mooted there was a general outcry from owners of restaurants and bars that eliminating smoking from their premises would reduce their financial viability, force them to lay off staff and reduce the number of overseas visitors to New Zealand. A year after the introduction of the legislation these dire predictions have proved incorrect and a growing number of non-smokers have returned to these venues. The legislation has resulted in smokers being forced to smoke outside. The socially imposed limitations on smokers, an increased awareness of their being different, and the inconvenience of having to smoke outside, have encouraged a greater number of current smokers to seek help with quitting (Asthma & Respiratory Foundation of New Zealand, 2005). Quit rates among current smokers are extremely low with approximately 2-3% of unassisted smokers succeeding in quitting (Doweiko, 2002).

To assist smokers to quit it would be helpful to establish whether they are dependent and to what degree. It would also be useful to ascertain whether an individual smoker's self-perception of whether they are nicotine dependent is accurate. Assessing whether their self-perceived nicotine dependence is correlated with formal measures of dependence would give us this information. The literature appears to suggest that various measures of nicotine dependence have little concordance because they measure different aspects of dependence. While a smoker may indicate that they are nicotine dependent there is research to suggest that some individuals rate of consumption would not account for their dependence. In this case the treatment options for different individuals would need to be modified, as the influences on the continuation of smoking may be more psychological, social or emotional in nature. An accurate description of

the relevant maintaining factors is necessary to implement the correct treatment options and to increase the chances of success.

In order to receive the necessary support to assist with cessation it is important to understand the factors that influence smoking initiation and maintenance. One of the ways to do this is to investigate the factors that differentiate smokers from non-smokers. One hypothesis is that these two groups differ on personality variables particularly the addiction trait as measured by the Eysenck Personality Questionnaire – Revised (EPQ-R; Eysenck & Eysenck, 1991). Following a review of the literature it appears that the EPQ-R Addiction Scale (AS) has not been used to measure the addiction trait in cigarette smokers.

Because personality is considered to be reasonably stable throughout an individual's lifetime, the elucidation of particular personality factors that are more prevalent in smokers may help to predict those individuals who are more at risk of becoming nicotine dependent. The resulting data could assist smoking prevention programmes to focus on those individuals who are most at risk of transitioning from smoking experimentation to regular smoking, in order to reduce the number of individuals who smoke. Understanding the personality variables that help to maintain smoking would also provide a guide to individualised treatment options. The introduction of focused smoking prevention programmes would be financially cost effective as well as reducing the numerous personal and financial costs associated with regular smoking. With the lack of success around smoking cessation it would appear to be much more effective to focus on prevention rather than treatment.

### *The Current Study*

The primary goal of this study was to investigate the utility of the Eysenck Addiction Scale in differentiating smokers from non-smokers. No previous studies were found in which the AS scale had been used to investigate the relationship between smokers and non-smokers. It was hypothesised that smokers would score higher on the Addiction Scale than non-smokers, as has been found for other substances.

A second goal was to identify the relationship between smoking status and the personality traits of extraversion, neuroticism and psychoticism as

measured by the EPQ-R. It was expected that smokers would score higher on all three personality scales. A further goal was to examine the concordance between different measures of nicotine dependence. Previous research indicates that the relationship between various smoking measures is minimal.

The final goal was to compare self-perceived nicotine dependence to established measures of nicotine dependence. Self-perceived nicotine dependence is infrequently investigated and the proposed outcomes of this relationship were unclear.

### *Overview*

The following chapter reviews the literature on the current state of cigarette smoking within New Zealand and compares the findings to the rest of the world. Chapter Three looks at defining smoking and nicotine dependence, and reviews the research on both dependent and non-dependent smokers. A final section summarises the various models of dependence and a number of nicotine dependence measures. Chapter Four looks at personality and focuses in particular on the model of personality developed by Hans Eysenck and his subsequent development of the Eysenck Personality Questionnaire. Chapter Five will investigate the relationship between personality and smoking.

## Chapter Two

### CIGARETTE SMOKING

#### THE NEW ZEALAND SITUATION

##### *Deaths Attributed to Cigarette Smoking*

Cigarette smoking is the major cause of preventable premature death in New Zealand (Cancer Society of New Zealand, 2001a; Ministry of Health, 2003) and many other developed countries (Peto, Lopez, Boreham, Thun, & Health, 1992; Siqueira & Brook, 2003). Ministry of Health figures estimate that between 4,300 and 4,700 New Zealanders die per year from "smoking-attributable" causes (Ministry of Health, 1999a; Tobias & Cheng, 2001). Smoking-attributable deaths are "premature or early deaths caused by smoking which would not have occurred if no one smoked" (Laugesen, 2000, p.28).

Approximately 347 deaths per year are attributed to second-hand cigarette smoke or passive smoking (Woodward & Laugesen, 2001). Smokers die on average 14 years earlier than non-smokers (Cancer Society of New Zealand, 2001a), half of those who die are middle aged (age 35-70 years) (Cancer Society of New Zealand, 1996; Laugesen, 2000). During the 1990's the smoking prevalence in New Zealand remained fairly stable although the cigarette consumption per smoker decreased (Laugesen, 2000).

##### *Smoking Consumption*

Among smokers aged 15 years and over the number of cigarettes smoked per day has reduced from 23 in 1985 (Laugesen, 2000) to 12 in 1999, with this consumption rate being maintained through to 2002 (Ministry of Health, 2003). The reduction in consumption is attributed to the high cost of cigarettes compared to wages, social pressures and the implementation of the Smoke-Free Environments Act (Laugesen, 2000). Policies involving increased taxation,

quit campaigns and the “Smokefree” promotions have also been credited with reducing cigarette consumption (Te Puni Kokiri, 1999).

In 2000 a survey carried out by ACNielsen (NZ) Ltd found that the majority of smokers in New Zealand smoked less than 10 cigarettes per day (Ministry of Health, 2001b). A further 33 percent smoked between 11 and 20 cigarettes per day with only 8% of respondents smoking more than 20 cigarettes per day. Males aged 55 years and older had the highest consumption rate (Ministry of Health, 2001b). By comparison American smokers rate of consumption was almost double on 28 cigarettes per day and Australians 21 per day (Laugesen, 2000). The reduction in the number of cigarettes smoked per day must be considered in the context of the finding that most of the people who die from smoking related illnesses were light or moderate smokers (Cancer Society, 2001a; Ministry of Health and the Cancer Society of New Zealand, 1996). In order to assess the impact of smoking it is necessary not only to consider the smoking consumption per individual but also the smoking prevalence.

#### *Adult Smoking Prevalence – Ethnic, Gender and Economic Differences*

In 1985 the percentage of adults 15 years and over who were smoking was 30%, which reduced to 26% in 1999 (Laugesen, 2000). In 2000 the smoking prevalence for this group was 25% (Ministry of Health, 2001b). This figure indicates the percentage of the population as a whole that smoke and distorts the important variations found among ethnic groups. In 1999 the smoking prevalence among European New Zealanders was around 20%, whereas approximately 50% of Maori and one third of Pacific Island peoples were smokers (Laugesen, 2000). When the age structure of the different ethnic groups is taken into consideration the smoking prevalence variation is reduced but remains evident (Ministry of Health, 2003).

Gender differences were also found with more men than women smoking amongst all ethnic groups other than Maori, in which the highest smoking prevalence was amongst women (Laugesen, 2000). Approximately 31% of deaths among Maori are attributed to cigarette smoking (Cancer Society of New

Zealand, 2001c). Differences in smoking prevalence were also apparent among different economic groups with the highest prevalence found among individuals who classified themselves as being on a low income or beneficiaries (Ministry of Health, 2003). Overall, smoking prevalence and daily consumption is reducing amongst the New Zealand population although adolescents remain the most vulnerable to smoking experimentation.

### *Smoking Prevalence among Adolescents in New Zealand*

Ninety percent of new smokers are children and teenagers, and the younger they initiate smoking the more likely they are to die of a smoking related disease (Cancer Society of New Zealand, 2001a). The smoking prevalence among adults in New Zealand has remained stable due to the increase in smoking among the younger age groups (Ministry of Health, 2002). In particular the smoking prevalence among 14-15 year olds continued to increase in contrast to national trends (Laugesen & Swinburn, 2000).

In 1998 43.5% of girls and 34% of boys smoked occasionally or regularly (Ministry of Health, 2000). This rate had significantly dropped by 2002 when the prevalence was 35.6% for girls and 23.4% for boys (Ministry of Health, 2003) and considerably higher than the smoking prevalence of 25% noted for females aged 15 years and older (Ministry of Health, 2001b).

Major smoking research in New Zealand has predominantly involved adults over 18 years. It was not until 1999 that national surveys regularly included the smoking behaviour of 14-15 year olds (Ministry of Health, 2002). The relationship between early initiation of regular smoking and subsequent increased risk of smoking attributable illness emphasises the need to investigate the factors that influence adolescent smoking behaviours from a young age.

### *Initiation and Progression to Regular Smoking among Adolescents*

Smoking experimentation commonly occurs around the age of 12-13 years (Health Sponsorship Council, 2000), is experienced as unpleasant, and is tried out of curiosity (Stanton, Silva, & Oei, 1989) or rebellion (Jarvis, 2004). Regular smoking is more likely to be established by the age of 14-16 years

(Fergusson & Horwood, 1995) in the company of friends of a similar or older age (Stanton et al., 1989) and is seen as a “social exchange” (O’Loughlin, Kishchuk, DiFranza, Tremblay, & Paradis, 2002). Benowitz (2001) found that the earlier smoking is initiated the higher the risk of becoming a regular smoker. Early initiation is also an indicator of higher cigarette consumption later in life (Everett et al., 1999) and higher levels of addiction (Unger & Chen, 1999). Stanton et al. (1989) in a study undertaken with New Zealand children aged 5-15 found that by the age of 15, 80% had tried smoking. They also noted that young people who smoked infrequently between the ages of 11-13 were found to be more at risk of becoming daily smokers by age 15.

Fergusson and Horwood (1995) found that the progression to regular smoking for young people aged 10-16 years was a one-way-process that was unlikely to be reversed. Although the initial decision to try smoking was generally made voluntarily continued use of the substance and the development of dependence generally reduced voluntariness (Loewenstein, 2001). Stanton et al. (1989) found that children’s knowledge of health risks did not impact on their smoking behaviour.

Jarvis (2004) established that within a year of smoking initiation, children inhaled a comparable amount of nicotine per cigarette to adults, they also attempted to quit, experienced cravings and suffered withdrawal symptoms. DiFranza, Rigotti, et al. (2000) noted that symptoms of nicotine dependence could occur without regular smoking, within days or weeks of initiation. They also found that young people who smoke occasionally were unlikely to quit smoking.

With every packet of cigarettes consumed shortening a smoker’s life and earlier quitting allowing the body a better chance of repair (Cancer Society of New Zealand, 2001a) there is considerable incentive for supporting adolescents to remain smoke free (John, Meyer, Rumpf, & Hapke, 2003).

### *Health Risks Attributed to Cigarette Smoking*

When analysing the health risks of cigarette smoking it is necessary to consider both active and passive health effects (Samet, 2001). Active health effects impact the smoker personally, whereas passive effects include the

impact on non-smokers. Both can result in reduced life expectancy (Tobias & Cheng, 2001) and an increased risk of death from cancer or cardiovascular disease (Ayanian, 1999; Cancer Society, 2001a).

Research has identified four major categories of health risk associated with smoking; cancer, heart diseases, respiratory diseases and reproductive problems (Samet, 2001). Women who smoke are at increased risk of infertility, irregular menstruation, and earlier menopause (Henningfield, 1985). Pregnant women who smoke cigarettes are in danger of spontaneous abortion and birth difficulties. Henningfield also notes lowered birth weight and an increase in the risk of a cot death or sudden infant death syndrome (SIDS). In 2003 it was estimated that 46% of cot deaths among Maori, and 24% among Pacific and European/other groups could be attributed to smoking (Ministry of Health, 2003).

Smoking has been related to a reduced sense of smell and taste, as well as premature and increased wrinkles (Teeson, Degenhardt, & Hall, 2002). Cigarette smoking has also been identified as a major cause of blindness with an estimated 1300 New Zealanders experiencing age related macular degeneration due to smoking (Wilson, Field, & Wilson, 2001).

#### *Health Risks Attributed to Passive Smoking*

Passive smoking, which involves the inhalation of environmental tobacco smoke (ETS) by non-smokers, has been associated with similar risks to active smoking. The direct impact on passive smokers includes increased risk of lung cancer and heart disease (American Psychiatric Association, 2000; Samet, 2001). Woodward and Laugesen (2001) estimate non-fatal illness based on second-hand smoke contributes to chest infections in children, childhood asthma, operations for glue ear, strokes, ischaemic heart disease admissions, and 27,000 additional general practitioner visits. Passive smoking is likely to affect all age groups in society including embryos (Henningfield, 1985). As well as the negative health outcomes attributed to both active and passive smoking there is evidence that smoking is also related to increased substance use.

### *Cigarette Smoking and Alcohol Use*

Among cigarette smokers co-morbidity between nicotine and other substances is a common finding (Degenhardt, Hall, & Lynsky, 2001). Doweiko (2002) suggests that the relationship between cigarette smoking and alcohol use may be due to the nicotine in cigarettes counteracting the sedating effects of alcohol. Adolescents who are regular smokers are eleven times more likely to drink heavily when compared to non-smokers (Kaplan & Sadock, 1998). Adults who are nicotine dependent are between four and eight times more likely to be alcohol dependent (John et al., 2003). Madden et al. (1997) found that 59% of female smokers who experience severe withdrawal symptoms were alcohol dependent, compared to 26% for those with mild or no symptoms. Cuijpers and Smit (2002) state that 30% of smokers can be diagnosed as alcoholic. They found that smoking and nicotine dependence was associated with having an alcoholic parent and suggested that genetic or environmental factors could support this relationship. Ritchey, Reid, and Hasse (2001) suggest that smoking shares a common cause with drinking and may increase the risk of illicit drug use.

### *Smoking and Illegal Substance Use*

Cigarettes are considered a "gateway" to the use of other substances (Cataldo, 2001; Ritchey et al., 2001; Siqueira & Brook, 2003). Daily smokers are at higher risk than irregular smokers of progressing to using other drugs (Kozlowski, Henningfield, & Brigham, 2001). Best et al. (2000) found that cigarette smoking was a better predictor of future drug use than alcohol use, however the combination of smoking and drinking predicted a higher incidence of both lifetime and recent drug use.

Adolescents who are regular smokers are eight times more likely to use illegal drugs when compared to non-smokers (Kaplan & Sadock, 1998). Siqueira and Brook (2003) found that earlier adolescent smoking was associated with marijuana and other illegal drug usage even when controlling for age, gender, ethnicity, social disadvantage and peer relationships or

personality. They suggested that early adaptation to nicotine use might increase cravings, which increased the likelihood of using other substances.

Kozlowski et al. (2001) caution that the interaction between smoking and other substance use may be more in the form of a risk factor than a causal path. John et al. (2003, p. 812) suggest that "dependence might be a phenomenon which has its severity expressed in part by being dependent on one or more substances". The associations found between the use of cigarettes and other substances suggest that quit programmes may need to consider co-morbidity as an assessment factor (Degenhardt et al., 2001). Assessment may also need to consider the presence of mental health issues.

### *Mental Health and Cigarette Smoking*

Co-morbidity between cigarette smoking and mental health problems is a common finding (John, Meyer, Rumpf, & Hapke, 2004). Smoking is related to increased rates of mental health problems (Degenhardt et al., 2001). A history of depression has a stronger association with cigarette smoking than substance abuse or affective disorders (Cataldo, 2001). Mood and anxiety disorders are thought to be more common among smokers than never smokers and former smokers (American Psychiatric Association, Diagnostic and Statistical Manual of Mental Disorders (text revision), DSM-IV-TR, 2000).

While 30% of the population at any given time is thought to have a mental disorder, this percentage increases to between 55% and 90% when studying individuals who currently smoke (American Psychiatric Association, 2000). As recently as 2005, Steinberg, Williams, Steinberg, Krejci, and Ziedonis found that among individuals diagnosed with schizophrenia 90% were smokers. Glassman (1993) found that 60% of participants in a clinical trial of smoking cessation had a history of major depression. Females with co-morbid nicotine dependence and a mental illness have been found to experience significantly more severe withdrawal symptoms (Madden et al., 1997). Killen, Fortmann, Schatzberg, Hayward, and Varady (2003) suggest monitoring depressive symptoms during the course of all smoking cessation programmes.

Strong, Brown, Ramsey, and Myers (2003) question the role of psychiatric disorders as possible risk factors for developing nicotine dependence, particularly among adolescents. Rohde, Lewinsohn, Brown, Gau, and Kahler, (2003) found that smoking was generally initiated before diagnoses of major depressive disorder, substance disorder and panic disorder were confirmed. Whereas, Breslau, Kilbey, and Andreski (1994) suggest the association between major depression and nicotine dependence may be explained by common predisposing factors. Fergusson, Goodwin, and Horwood (2003) found evidence of a possible causal linkage between depression and smoking however they also cautioned that the direction of causality was not clear.

It is possible that the use of cigarettes may be an act of self-medication. Smokers who experience negative mood states may find the initial high from nicotine relieves symptoms of depression or anxiety (Doweiko, 2002). Irrespective of causality the research overwhelmingly suggests the importance of a thorough assessment of mental health status when working with individuals who are nicotine dependent (Williams & Ziedonis, 2004). A further concern is the possibility of interactions between nicotine and medications.

Doweiko (2002) cautions that interactions between nicotine and medication may reduce the effectiveness of prescription medicines. Smokers require more morphine than non-smokers to control pain. Smoking may reduce the sedating effects of benzodiazepines, may reduce the blood levels of antipsychotics by as much as 30% and can increase the levels of some antidepressants. This suggests that not only is the cigarette smoker more at risk of having a co-morbid mental illness but that any prescribed medications are likely to be less effective. Not only are smokers at increased risk of experiencing both physical and mental health complaints in some situations they are also responsible for placing an increased financial burden on their families and the wider community.

### *The Financial Impact on Families of Cigarette Smoking*

The cost of cigarettes has a direct impact on the disposable household income of many families (deBeyer, Lovelace, & Yurekli, 2001; Siahpush,

Borland, & Scollo, 2003). Thomson, Wilson, O'Dea, Reid, and Howden-Chapman (2002) found that cigarette smoking was a contributing factor to financial hardship particularly in low-income households. A study completed in 2002, found that families that included a single parenting adult who smokes were spending on average 6% of their household income on cigarettes (Thomson et al.). This percentage was closer to 10% in the lowest socio-economic group ( $\leq 15,000/\text{year}$ ). In these households it was considered likely that spending on cigarettes would directly impact on the "level of food quality, food security, housing quality, educational experiences and health care" (Thomson et al., Discussion section, ¶ 2). These financial disadvantages may be more pronounced for Maori and Pacific Island peoples who are statistically more likely to be in the lowest socio-economic group and have a higher overall prevalence of smoking (Maori Smokefree Coalition, 2003). While the direction of causality is not clear, individuals on low incomes continue to have the highest smoking prevalence in New Zealand among the various socio-economic groups (Ministry of Health, 2003).

#### *Financial Costs Associated with Cigarette Smoking in New Zealand*

The total cost of smoking to New Zealand society for the year ended 1997 was estimated at 1.22 billion dollars and excluded factors such as reduced quality of life (Tobacco Control, 2003). The cost of premature death or disability from disease, and the suffering of families were estimated at a total yearly cost of 22.5 billion in the same year (Tobacco Control, 2003). The larger scale financial costs attributed directly to smoking included health costs, tobacco control and a number of extraneous costs. In 1992 the smoking related public health costs were approximately 202 million dollars. Lost earnings were attributed to cigarette breaks, increased absenteeism due to ill health or childcare responsibilities, and early death (Tobacco Control, 2003). Material costs included ventilation, additional cleaning and increased insurance premiums (Health Funding Authority, 1999). The New Zealand government spent \$28 million on tobacco control in 2002, although this was only 3% of the \$950 million collected from the tax on tobacco (Maori Smokefree Coalition, 2003; Thomson et al., 2002). While the main focus of tobacco control may be

to save lives there are corresponding social and financial benefits to be achieved (Cromwell, Bartosch, Fiore, Hasselblad, & Baker, 1997).

### *Tobacco Control History in New Zealand*

New Zealand is considered a world leader in tobacco control. A concerted effort by government and other agencies has led to the development of smoking reduction programmes that are considered amongst the most comprehensive in the world (Laugesen, Scollo, et al., 2000). Tobacco control within New Zealand has a fairly recent history. A comprehensive plan for smoking reduction was first developed in 1985, followed by the Smoke-free Environments Act banning print advertising and smoking in offices (Laugesen, 2000). This was amended in 1997 to ban cigarette sales to anyone under 18 years of age, limited pack sizes to a maximum of 20 cigarettes, and introduced penalties for manufacturers exceeding the limits set for harmful substances in cigarettes. Since the first plan was introduced further action has included tax increases on cigarettes, which have reduced consumption, media quit campaigns and access to free nicotine replacement products (Laugesen, 2000). Between 1985 and 1998 tobacco control was attributed with reducing tobacco use by almost half, predominantly through the decrease in consumption per smoker as opposed to smoking prevalence (Laugesen & Swinburn, 2000).

### *Recent Developments in Tobacco Control*

In 2004 further amendments to the Smoke-free Environments Act 2003 were introduced in New Zealand (New Zealand National Drug Policy, 2004). These included the requirement that all indoor workplaces and hospitality venues were to be 100 percent smoke-free. The intention of these changes were to reduce the exposure to tobacco smoke in the environment (Cancer Society of New Zealand, 2001b). Restrictions on the accessibility of vending machines, prominence of retail displays and co-packaging of cigarettes with other products were also implemented (NZ National Drug Policy, 2004). Many of these changes were aimed at reducing accessibility to the younger age groups.

The outcome of a study reviewing the impact of the Act found that there had been an increase in the number of calls to the Quitline and a marked decrease in socially-cued smoking (Asthma & Respiratory Foundation of NZ, 2005). A corresponding increase in patronage by non-smokers had reduced the predicted financial hardship to restaurants and bars, and an increasing percentage of patrons supported the new legislation.

## COMPARING NEW ZEALAND TO THE REST OF THE WORLD

### *Smoking Prevalence*

In 2004 it was estimated that there were 1.2 billion smokers worldwide (Edwards, 2004). It was predicted that in the same year 4 million people would die from smoking related diseases. The initial smoking prevalence in various countries follows a fairly predictable bell shaped curve with an initial rise in smoking prevalence followed by a phase of steady decline. These two phases are followed within 20-30 years by a similar trend in smoking related diseases (Edwards, 2004).

More affluent and developed countries such as North America, Western Europe, the United Kingdom and Australasia have experienced the peak in smoking prevalence and have now reached a plateau. This appears to be the case in New Zealand, which has a smoking prevalence comparable to Canada and Australia (Ministry of Health, 2003). New Zealand youth have a similar smoking prevalence to their Australian counterparts, which is generally less than Europe and the United States (Ministry of Health, 2003). The smoking prevalence in many less developed countries is still on the rise.

### *Gender Differences in Smoking Behaviour*

In comparison with other developed countries New Zealand males smoke relatively less whereas women smoke more than average (Ministry of Health, 2003). New Zealand adolescents smoking prevalence is relatively low

when compared internationally (Ministry of Health, 2003). In a study of 14 OECD Countries, New Zealand men ranked fourth and women ranked ninth for smoking prevalence. However gender differences played a significant role in the average smoking prevalence with Japanese women having the lowest prevalence (17%) amongst all of the countries and Japanese men the highest at around 55% (Ministry of Health, 2003). Among males the smoking prevalence in India was 45%, 53% in Japan, 63% in china and 69% in Indonesia (Edwards, 2004). Overall New Zealand smoking behaviour is similar to the more developed countries when comparing current smoking behaviour on gender, ethnic and socioeconomic measures, as well as smoking prevalence and consumption.

### *Ethnic and Socio-Economic Comparisons*

Smoking prevalence in Britain varies among ethnic groups (Edwards, 2004) as has been found with the New Zealand population (Ministry of Health, 2003). However research undertaken in America found that anti-smoking interventions were equally successful across different ethnic groups (Coleman, 2004). A further similarity between New Zealand and other developed countries included the finding that lower socioeconomic groups appear to have a higher smoking prevalence than those on a higher income (Coleman, 2004; Lindstrom & Ostergren, 2001).

### *Tobacco Control*

Tobacco control within New Zealand has been successfully introduced throughout the country. Jamrozik (2004) suggests a number of interventions, which are already law in New Zealand. Banning smoking in public places, price regulation, public education, banning cigarette advertising, prosecution of illegal sales and reducing display space are among the strategies suggested. These strategies have variously been shown to be effective in South Australia, Norway, Canada, the United States and Ireland. New Zealand has implemented all of these interventions and remains at the forefront of tobacco control (Laugesen & Scollo, 2000). Scollo, Lal, Hyland, and Glantz (2003)

completed a review of 97 studies that investigated the economic impact of smoke-free policies in the hospitality industry. They concluded that there was no negative economic impact and in some cases positive outcomes following the introduction of smoke free legislation. While there is overwhelming evidence for the negative aspects of cigarette smoking a small amount of research has established positive results for cigarette smoking.

### *POSITIVE ASPECTS OF CIGARETTE SMOKING*

Many smokers state that they find smoking pleasurable (Kozlowski et al., 2001). Adolescents surveyed by O'Loughlin, Kishchuk, et al. (2002) noted that they enjoyed certain aspects of smoking. These included feeling relaxed or calm, the pleasure of experiencing a high and enjoying the taste. They also noted playing with the smoke as well as having something in their hands or something to do when bored.

Stanton et al. (1989) found that children as young as 11 years noted the relief of boredom and calming of nerves as positive aspects of smoking. Smoking is thought to increase cognitive functioning and improve vigilance and concentration, as well as reducing anxiety and aggression (Henningfield, 1985). Smoking has also been found to help control weight by reducing the appetite for sweet food, inhibiting energy extraction, and reducing the desire to eat during stressful periods (Dodgen, 2005; Henningfield, 1985). Samet (2001) notes that smoking has been shown to reduce the risk of Parkinson's disease, Alzheimers disease and endometrial carcinoma. These findings were not promoted as supporting cigarette smoking behaviour but as an encouraging avenue for further research.

### **SUMMARY**

Smokers generally know that smoking is bad for their health. Both children and adults are aware of the health risks associated with cigarette smoking. While New Zealand smokers on average have a low rate of consumption when compared to the rest of the world there is no associated

reduction in health risks. The smoking prevalence in New Zealand appears to have stabilised as has been shown in other developed countries, however the prevalence of initiation among young people has not been affected. Within the New Zealand population gender, age and ethnic differences are apparent in smoking prevalence and consumption, suggesting a need for diversity in education, assessment, support and management.

Smokers are more likely to be using alcohol and other illicit drugs than non-smokers. They also have an increased rate of mental health problems. While the direction of causality may be unclear the increased risk of co-morbid disorders among cigarette smokers is well established.

Smokers are aware that smoking is expensive. With the introduction of smoke-free legislation cigarette smoking has become more socially unacceptable. The negative aspects of cigarette smoking far outweigh any small positive results. The human and financial cost of smoking is immense. When weighing up the costs and benefits smoking makes no sense. Why then do smokers smoke?

## Chapter 3

### SMOKING AND DEPENDENCE

#### DEFINING SMOKERS

Smoking categorisation occurs on a continuum from having never tried smoking to heavy daily consumption. Researchers are generally inconsistent when defining, measuring and assigning participants to smoking categories (Terracciano & Costa, 2004). Kenford et al. (2002, p. 216) were scathing in their assessment of the consistency of variable definition for smoking, stating that “predictor variables are not selected on the basis of well defined theories or models...variables are typically tested in isolation or in a hit-and-miss manner”.

#### *Inconsistencies in Variable Definition*

There are no universally agreed criteria for smoking variables, particularly among never smokers and occasional smokers. Stanton et al. (1989, p. 4) when describing children’s smoking behaviour defined occasional smoking as “did not smoke every day but had smoked in the last month”. Rigotti et al., (2000, p. 160) categorise smokers as “having smoked at least one cigarette in the month before admission” to hospital. Alternatively, Vollrath and Torgersen, (2002, p. 1189) define current smoking as “smoking at least one cigarette per week” and heavy smoking as “smoking at least 20 cigarettes per day”. This level of inconsistency brings into question the validity of comparing various research outcomes (Terracciano & Costa, 2004). In order to allow comparisons it is necessary to describe the various variables being used in a particular study. Spielberger and Jacobs (1982) further emphasise the need to consider initiation and maintenance of smoking as separate categories for research. They propose that when discussing initiation of smoking, current and ex-smokers should be combined whereas the continuation of smoking should investigate current and ex-smokers separately.

### *Smokers Defined*

The Ministry of Health in New Zealand (2003) defined daily smokers as individuals who smoke one or more cigarettes per day and excluded individuals who smoke less frequently. Occasional smokers were defined as individuals who smoke at least weekly and the more general term "smokers" was used to describe these two categories when combined. In order to provide a measure of consistency and to enable comparison to a similar population this study will replicate the Ministry of Health categories by using the terms: daily, occasional, former and non-smokers. Because the rates of consumption at the lower end of the smoking continuum cannot guarantee physiological dependence to nicotine, smoking consumption will be considered distinct from nicotine dependence.

### WHAT IS NICOTINE

#### *What is nicotine?*

Nicotine is the addictive substance contained in cigarettes (USDHHS, 1988; Wonnacott, Sidhpura, & Balfour, 2005). It is an organic chemical similar in structure to cocaine and morphine, which is found in the leaves of the tobacco plant. The small size of the nicotine molecule and its solubility in fats and water allows it to be rapidly absorbed into the bloodstream. This results in nicotine being delivered to the rest of the body within 5 -10 seconds (Benowitz, 2001; Doweiko, 2002; Kozlowski et al., 2001). Due to its pH cigarette smoke is not easily absorbed in the mouth. Therefore cigarette smoke has to be drawn deeply into the lungs where pH does not impact absorption.

The psychoactive properties of nicotine are responsible for the changes in mood and emotions experienced by smokers (Dodgen, 2005; Doweiko, 2002). The higher the concentration of nicotine, and the faster the delivery, the stronger the effects (Kozlowski et al., 2001). Nicotine's high potency accounts for the small amount of drug needed to achieve the desired effect. The potency of nicotine is 5 -10 times higher than either cocaine or morphine. Inhaling nicotine through cigarette smoke is the most effective method of delivery (Kozlowski et al., 2001). The nicotine from patches provides a much slower

release of nicotine at a lower dose and with a lower peak, resulting in reduced satisfaction when compared to inhalation.

### *Pharmacological Effects of Nicotine*

The pharmacological effects of nicotine vary throughout the day depending on consumption. Nicotine is distributed throughout the body using the same process as oxygen, which results in the entire blood supply going through the heart each minute. Peak nicotine concentrations occur within the first few minutes of smoking and then begin to decline (Doweiko, 2002) enabling a repeat of the rush experienced with each cigarette (Dodgen, 2005). The resulting behavioural and sympathetic changes can include pleasure, appetite suppression, improved memory and task performance, as well as reduced anxiety and tension (Benowitz, 2001). The half-life of nicotine is thought to be between 1½ to 2 hours (Doweiko, 2002) and 2-3 hours (Benowitz, 2001) resulting in a reservoir of unmetabolised nicotine accumulating in the body. Increased amounts of nicotine are required to gain the same effect resulting in increased consumption throughout the day. The brain chemistry is simultaneously changing to accommodate the chemicals provided by the cigarette, generally resulting in tolerance (Doweiko, 2002).

### *Tolerance to Nicotine*

Tolerance is the process of requiring increased amounts of a particular substance in order to achieve the desired effect, or experiencing a reduced effect from using the same amount of a substance (American Psychiatric Association, 2000). Tolerance develops rapidly with increased use of nicotine (Dodgen, 2005). A non-smoker who smoked 20 cigarettes in a day would be likely to experience toxicity, resulting in nausea and possibly vomiting, while a regular smoker would have developed a degree of tolerance to the effects of nicotine (Doweiko, 2002; American Psychiatric Association, 2000). The amount of positive effect delivered by each consecutive cigarette diminishes as the brain becomes less sensitive and tolerance develops (Benowitz, 2001). Overnight abstinence reduces the degree of tolerance to a level at which the

smoker experiences the first cigarette of the day with renewed sensitivity (Dodgen, 2005). This results in the first cigarette of the day being generally the most rewarding and providing feelings of pleasure and arousal (Benowitz, 2001; Doweiko, 2002; Henningfield, 1985; Kozlowski et al., 2001) although some smokers might delay the first cigarette of the day because of its “noxious” taste (Kozlowski, Director, & Harford, 1981).

The degree of tolerance is thought to depend on the efficiency with which the body can eliminate the drug and the reduced responsivity of nerve cells. Other factors that may affect tolerance include consumption, age, gender, body weight and medical conditions as well as co-morbid medication and substance use (Dodgen, 2005). Long-term smokers generally exhibit a greater degree of tolerance (Henningfield, 1985). Recent research has disputed the relationship between tolerance and nicotine dependence. Perkins et al. (2002) found that equal levels of tolerance were found in non-dependent, dependent and former smokers. This adaptation allowed relapsed smokers to return to levels of smoking that non-smokers would find toxic, without adverse effects. Perkins et al. (2002) suggests a higher correlation between withdrawal symptoms and nicotine dependence. Withdrawal symptoms commonly emerge as the body is deprived of nicotine.

### *Nicotine Withdrawal*

Withdrawal is a physical, emotional and cognitive state that occurs when a substance is no longer consumed (American Psychiatric Association, 2000). The severity of symptoms is dependent on the quantity and duration of substance use (Woody, Cottler, & Cacciola, 1993). Withdrawal symptoms are commonly avoided by repeated use of a substance or increasing the rate of use. Withdrawal symptoms generally start within two to three hours of cessation and are most severe at around one to four days. A marked improvement is generally seen within three to four weeks following cessation (American Psychiatric Association, 2000). Hunger and weight gain are often evident for six months following cessation, with quitters commonly gaining between two to three kilo's in the first year (American Psychiatric Association, 2000). Females are more likely to identify weight gain and increased appetite

as symptoms of withdrawal (Stanton 1995). Approximately one third of quitters will gain weight (Henningfield, 1985) although weight gain has been associated with increased success in quitting smoking (Doweiko, 2002). Cataldo (2001) notes that approximately 50% of adults who attempt to quit smoking will meet DSM-IV-TR criteria for nicotine withdrawal. The American Psychiatric Association (2000) suggests that the majority of the 80% of regular smokers who meet criteria for nicotine dependence will experience withdrawal symptoms.

## NICOTINE DEPENDENCE

There is currently no single accepted definition of addiction (Atrens, 2001) or substance dependence (Kaplan & Sadock, 1998; Kenford et al., 2002). In 1990, Goodman endeavoured to quantify the definition of the term addiction in order to provide a scientifically useful term. Currently the most commonly used definitions are those of the World Health Organisation (WHO), the American Psychiatric Association (APA) and the Surgeon General's Report on Smoking and Health published in 1988 (Atrens, 2001).

### *Addiction Versus Dependence*

The WHO replaced the term addiction with dependence in 1964 as it was decided the term no longer had any scientific meaning (Kaplan & Sadock, 1998). Nicotine was not considered dependence producing by the WHO until 1974. The APA first considered nicotine addictive in the DSM-III in 1980. More recently DSM-IV-TR published in 2000 replaced the term addiction with dependence. The DSM-IV-TR does not offer a separate set of criteria for nicotine dependence and acknowledges that some of the general substance dependence criteria such as abuse and intoxication do not apply to nicotine dependence (American Psychiatric Association, 2000).

### *Defining Nicotine Dependence*

As recently as 2005, Etter noted that a review of literature did not provide any consensus regarding a definition for nicotine dependence. The APA definition describes the maladaptive use of cigarettes as a mental disorder. The WHO continues to use craving as a core symptom of nicotine dependence where as the APA has removed this criterion. A review in 2000(b) by Colby, Tiffany, Shiffman, and Niaura concluded that “the field lacks a widely accepted, theoretically derived, and psychometrically-sound research tool for evaluating nicotine dependence” (p. S36). They hypothesised that this was partly due to the lack of clear evidence regarding the specific causal pathway between nicotine, neurotransmitters and nicotine addiction (also, Batra, 2004). Watkins, Koob, and Markou (2000) confirmed that the neurochemical systems involved in nicotine withdrawal were unclear. Because the physiological link between nicotine and dependence has not been definitively identified it has not been possible to establish a single agreed method for establishing or measuring the presence of nicotine dependence. While the core symptoms for nicotine dependence continue to be debated, American Psychological Association diagnostic criteria are commonly used in both applied and research settings.

### *Nicotine Dependence as Defined by DSM-IV-TR Criteria*

The DSM-IV-TR criteria for nicotine include Nicotine Dependence (305.1) as a subset of Substance Dependence, and Nicotine Withdrawal (292.0). Substance Dependence involves symptoms in the cognitive, behavioural and physiological domains. The generic criteria require a “maladaptive pattern” of use and “clinically significant impairment or distress” within a 12 month period (American Psychiatric Association, 2000, p. 197). DSM-IV-TR uses a threshold model, which requires three or more criteria to be present for the diagnosis of Substance Dependence. These include increasing use, unsuccessful quit attempts, spending a lot of time to maintain use, limiting activities, continuing despite knowledge of problems related to use, as well as tolerance and withdrawal. Between 80 and 90% of regular smokers meet criteria for Nicotine Dependence (American Psychiatric Association, 2000). The use of DSM-IV-TR criteria identifies at what point nicotine dependence is considered a mental

disorder and presupposed the presence of a withdrawal syndrome (DiFranza et al., 2002).

#### *DSM-IV Criteria for Nicotine Withdrawal*

The DSM-IV-TR diagnostic criteria for nicotine withdrawal require a person to have smoked daily for at least two to three weeks. Symptoms include dysphoria or depressed mood, insomnia, irritability, frustration or anger, anxiety, difficulty concentrating, restlessness, decreased heart rate and increased appetite or weight gain (American Psychiatric Association, 2000). Symptoms of withdrawal are similar across the various substances. A rebound effect is thought to cause withdrawal symptoms (Henningfield, 1985). Whereas smoking commonly causes increased heart rate, weight loss or maintenance, increased concentration and heightened arousal, the reverse of these findings are included in the symptoms of withdrawal. Symptoms are generally experienced within 24 hours of smoking cessation (American Psychiatric Association, 2000). A diagnosis of nicotine withdrawal also requires that symptoms cause “clinically significant distress or impairment in social, occupational, or other important areas of functioning”, and the exclusion of a general medical condition or mental disorder (American Psychiatric Association, 2000, p. 266).

#### *Craving*

Craving, which is a strong desire or urge for a substance (Pomerleau, Collins, Shiffman, & Pomerleau, 1993), is not used in the DSM-IV-TR definition of substance dependence but is considered a common side effect of cigarette smoking (American Psychiatric Association, 2000). Craving is often used in smoking research as a symptom of nicotine withdrawal (Colby et al., 2000b; Fergusson & Miller, 2001; Madden et al., 1997; Rigotti et al., 2000; Riedel, Robinson, Klesges & McLain-Allen, 2003) and is included in the World Health Organisation diagnostic criteria (DiFranza et al., 2002).

Craving was removed from DSM criteria due to inconsistencies in the research findings regarding craving and withdrawal symptoms (Colby et al., 2000b). Among adolescent smokers craving is the most prevalent symptom

endorsed when measuring withdrawal (Colby, Tiffany, Shiffman, & Niaura, 2000a). Among regular smokers 93% identified the experience of craving as a reason for their smoking behaviour (Shiffman, Kassel, Paty, Gnys, & Zettler-Segal, 1994).

Doweiko (2002) described four situations that enhance the experience of craving. These included avoidance of withdrawal symptoms, and negative mood states, external cues, and enhanced feelings of pleasure. Once dependence is established craving is thought to be a major maintaining factor in continuing the use of a substance (Lowenstein, 2001) and also plays a major role in relapse (Dodgen, 2005). The impact of even mild craving is hypothesised to relate to a number of factors. These include the continual nature of the craving experience, its unconscious action, an immediate reward, and reduced craving from taking the substance (Lowenstein, 2001). Although many smokers may experience craving for cigarettes not all smokers are nicotine dependent.

## NON-DEPENDENT SMOKERS

### *Chippers - Non-Dependent Cigarette Smokers*

In 1988 the US Department of Health identified that 5-10% of smokers smoke five or less cigarettes per day (Shiffman, Paty, Kassel, Gnys, & Zettler-Segal, 1994). This group of smokers who smoke a minimum of four days per week are commonly referred to as "chippers" (Dodgen, 2005; Doweiko, 2002). They smoke within hours of waking, may discontinue smoking for a period of time without associated withdrawal symptoms and can be reformed heavy smokers (Shiffman, Paty, et al., 1994). Lindstrom and Isacson (2002) found that chippers generally continue to smoke intermittently rather than becoming more regular smokers.

Chippers do not differ from other cigarette smokers in their smoking topography including the number of puffs, duration, the amount of time between cigarettes (Brauer, Hatsukami, Hanson, & Shiffman, 1996) as well as average

puff volume (Corrigall, Zack, Eissenberg, Belsito, & Scher, 2001). Shiffman et al. (1994) disproved a theory that chippers smoke more on weekends, finding that they generally smoked less on the weekend and more during the week. Regular smokers' rate of cigarette consumption did not differ between weekdays and weekends, whereas only 49.2% of chippers smoked daily.

Differences found between regular smokers and chippers in a study conducted by Shiffman et al. (1994), found that chippers did not differ on basic demographic variables such as gender, age, education, marital status or social class. Both groups had initiated smoking at a similar age (14 years) and had smoked for a similar number of years. The study indicated that chippers were more likely to smoke when drinking alcohol, when others were smoking and when in social situations. A difference in mood states when smoking was also noted. Chippers tended to smoke when in a positive mood and feeling relaxed whereas regular smokers smoked more in a negative mood than in a positive or neutral mood, and reported stress as a reason for smoking.

Chippers may go without smoking for a week. Fifty two percent of chippers felt this was not too difficult while only three percent of regular smokers felt the same. Lindstrom (2001) found that while 68% of daily smokers wanted to stop smoking only 32% of chippers expressed the same desire. Current research has not identified the personality or biological characteristics that separate dependent from non-dependent smokers (Doweiko, 2002). Generally tobacco chippers would not meet criteria for nicotine dependence or withdrawal.

## DEPENDENT SMOKERS

While tobacco chippers may not meet the criteria for nicotine dependence, the majority of daily smokers do. Among regular smokers it is estimated that 80-90% are nicotine dependent (Doweiko, 2002; American Psychiatric Association, 2000). Nicotine dependence may be experienced differently in adolescents than in adults. This may be due to metabolic differences, body weight, maturational state, personality factors and social

pressure (Dodgen, 2005). Ethnic differences have also been found to impact on nicotine dependence. Identified gender differences in the rate of dependence may be due to the sex differences in metabolism and body weight.

### *Adolescent Nicotine Dependence*

Symptoms of nicotine dependence in adolescents can occur within days or weeks of starting smoking. These symptoms can occur before daily smoking is established (DiFranza et al., 2000). While a high proportion of adolescent daily smokers are nicotine dependent, the prevalence is still lower than that among adults (Colby, Tiffany, Shiffman, & Niaura, 2000a). Furthermore adolescents generally smoke irregularly at a lower prevalence and are less likely to be daily smokers. Girls generally develop symptoms sooner than boys and symptoms may occur before tolerance is established (DiFranza et al., 2002).

DiFranza et al. (2002) found that smoking frequency and consumption did not predict an identifiable threshold for the experience of dependence symptoms among adolescents. Symptoms could occur after minimal exposure to cigarette smoking. Adolescents may experience withdrawal symptoms in situations when they are not making a quit attempt such as overnight abstinence, when in school or when trying to cut down (Colby et al., 2000a). Young people inhale and consume a similar amount of nicotine per cigarette to adults despite their initial inexperience (Benowitz, 2001).

Among 12 and 13 year olds the first symptom of nicotine dependence could occur from having as little as "two cigarettes, one day per week" (DiFranza et al., 2002, p. 228). This rate of consumption would be unlikely to meet the criteria for nicotine dependence using DSM-IV-TR and many other measures of dependence. Generally adolescent dependence is around half the rate of adult dependence although subjective measures of dependence completed by adolescents find a higher percentage consider themselves to be dependent (Colby et al., 2000a). DiFranza et al. (2000; Johnson et al., 2003) propose that current measures of nicotine dependence may not adequately measure the diverse presentations of symptoms experienced by adolescents.

There is currently no single measure of nicotine dependence specifically recommended for use among adolescents (Colby et al., 2000b).

### *Adult Nicotine Dependence and Compensatory Smoking Strategies*

Nicotine dependence has led to an identifiable collection of compensating strategies to enhance nicotine consumption. Benowitz (2001) notes that variation can occur among smoking habits such as the type of cigarette (menthol versus non-menthol), number of cigarettes consumed per day, variations in tar levels and nicotine percentage. He also identified variations in metabolism with African Americans having higher cotinine levels despite lower levels of consumption. This finding was attributed to lower incomes, which correlated with the extraction of more nicotine per cigarette and smoking menthol cigarettes. Menthol cigarettes provide a cooling sensation when smoked enabling deeper and longer inhalation (Benowitz, 2001). Ethnic differences are further supported by the finding that African Americans experience significantly fewer withdrawal symptoms when making a quit attempt than Caucasians (Riedel et al., 2003). Furthermore "White" smokers have a higher rate of nicotine dependence than "Black" smokers (Colby et al., 2000a). Smokers of low nicotine cigarettes were more likely to smoke more cigarettes per day, have a shorter delay between puffs, have more puffs per cigarette and to smoke closer to the butt (Berger, 1982). Doweiko (2002) states that 90-95% of cigarette smokers are addicted to nicotine, of these individuals only 2-3% (5%, American Psychiatric Association, 2000) successfully quit smoking each year. Just as there are numerous definitions of dependence so there are many theories of addiction and dependence.

## THEORIES OF DEPENDENCE

Nicotine dependence is commonly thought to involve the physiological, psychological and behavioural domains (Colby et al., 2000b; American

Psychiatric Association, 2000). Theories of dependence vary on the emphasis placed on these various aspects.

### *Genetic*

Research has shown that genetic factors are involved in smoking initiation, nicotine dependence, sensitivity to nicotine, tolerance development and withdrawal symptom severity (Hall, Madden, & Lynsky, 2002). Lerman et al. (1999) found that an identifiable dopamine transporter genotype was associated with smoking risk, initiation and quitting. Candidate genes have been identified for dopamine mechanisms and some cancers however this research is in its early stages and researchers suggest multiple genetic factors are involved (Hall et al., 2002). Batra (2004, p. 5) found support for a genetic role in "nicotine metabolism, the effects of nicotine on neurotransmission and the nicotine sensitivity". Genetic factors are thought to play a role in all aspects of nicotine dependence. Furthermore a common genetic component is thought to contribute to a variety of substance use disorders, which may account for the high prevalence of homotypic co-morbidity. Shadel, Shiffman, Niaura, Nichter, and Abrams (2000) caution that genetics must be considered as a foundation when investigating all theories of dependence. Although, current research findings cannot fully explain the development of nicotine dependence (Batra, 2004; Wonnacott et al. 2005).

### *Neurobiological*

Neurobiological models of nicotine dependence focus on the impact of nicotine on the nervous system and brain (Kozlowski et al., 2001). The nicotine addiction hypothesis states that "smokers are unable to stop because nicotine changes the brain in such a way as to perpetuate its use" (Atrens, 2001, p. 326). Shadel, Shiffman et al. (2000) identified two schools of thought with regards to dependence. The neuroadaptive models suggest that increased substance use affects neuroreceptors by causing them to become desensitised and increasing the number of available receptors sites. They state that adaptation results in tolerance. In response to the toxicity produced by nicotine

the brain produces more receptor sites in the nervous system and brain to cope with the nicotine (Kozlowski et al., 2001). Discontinuation of the substance is thought to cause a rebound effect as the body tries to stabilise itself to a pre-substance level, resulting in withdrawal (Shadel, Shiffman, et al., 2000).

The second neurobiological model reviewed by Shadel, Shiffman et al. (2000) is based on the reward pathways. Nicotine is thought to increase the release of neurotransmitters in the reinforcement pathways. These include dopamine and endorphin (Shadel, Shiffman, et al., 2000) as well as acetylcholine, norepinephrine and serotonin (Teesson et al., 2002). Acetylcholine, which is the same shape as nicotine, is responsible for activating other neurotransmitters and hormones. When nicotine takes the place of an acetylcholine molecule at the receptor site of the synapse it initiates an increased rate of neurotransmitter release (Teesson et al., 2002). The hormones adrenalin and noradrenaline are also affected by nicotine. Adrenaline is normally released when people are bored, anxious or stressed. Noradrenaline is related to excitement and released during exercise, sex and when using anti-depressant drugs. The increased release of these two hormones results in stimulation and stress reduction, which may allow smokers to adjust their mood or emotional state by managing consumption (Teesson et al., 2002). Dopamine, serotonin and norepinephrine have been associated with pleasure and reduced appetite (Kozlowski et al., 2001). Many adolescent cigarette smokers report smoking for reward rather than to relieve withdrawal symptoms (Corrigal et al., 2001).

A large amount of research has identified that nicotine acts on neurotransmitters in the brain. The specific pathways remain speculative. While biological mechanisms can account for some aspects of nicotine dependence it cannot account for the presence of such factors as socioeconomic differences in smoking (Lindstrom & Ostergren, 2001).

### *Behavioural*

The two main behavioural models of dependence are based on instrumental or operant conditioning, and classical conditioning. While both of these models have their roots in behavioural approaches they are based on the

understanding that substances produce physiological and subjective effects and are generally ingested in the same contexts (Shadel, Shiffman, et al., 2000).

In instrumental behaviour the individual performs the behaviour in order to receive reinforcement or to avoid punishers, which results in the behaviour becoming controlled by consequences. In the case of the daily smoker it is hypothesised that they continue to smoke either because of the positive gains they receive from smoking or because they wish to avoid the negative consequences of smoking such as withdrawal symptoms.

Classical conditioning involves stimuli that precede and elicit a response. An example of this would be Cue Exposure Theory (Teeson et al., 2002). This theory suggests that cues, which are present at the time of substance use, play a role in developing and maintaining dependence. Cues that may elicit smoking may include sensory and environmental stimuli. Sensory stimuli include the sight and taste of cigarettes. Emotions or an individual's mood may also act as stimuli. Environmental stimuli, may include drinking alcohol, answering the telephone, time of day or observing others smoking. The presence of a particular cue may stimulate a need to smoke (conditioned response) and is thought to play a role in craving (Ferguson & Miller, 2001; Kozlowski et al., 2001; Teeson et al., 2002). The almost immediate reinforcement that a smoker receives from having a cigarette plays a role in increasing the likelihood that the behaviour is repeated, as does the avoidance of withdrawal symptoms (Kozlowski et al., 2001). Benowitz (2001) suggests that such behavioural responses explain the difficulty in quitting smoking long after physical dependence has abated therefore behavioural responses may remain six months or longer following smoking cessation.

### *Cognitive Learning Models*

Cognitive Learning Models of dependence are based on the understanding that "internal states of humans mediate the relationship between the environment and the substance use behaviour" (Shadel, Shiffman, et al., 2000, p. S16). There is a reciprocal relationship between the individual and the environment. The individual influences their social environment and the social environment reciprocally influences the cognitive representations and emotional

reactions of the individual. Learning occurs through direct observation as well as personal experience. Observation provides insight into others attitudes toward the substance and moulds cognitive and emotional responses. This particular model of dependence is likely to be relevant to individuals who dislike their first taste of a cigarette but persevere in order to fulfil perceived social obligations. Personal experience may then lead to physical as well a psychological dependence (Shadel, Shiffman, et al., 2000).

### *Biopsychosocial Model*

The biopsychosocial model of addiction involves a “complex behaviour pattern having biological, psychological, sociological, and behavioural components”, and is the basis of most addiction treatment (Teeson et al., 2002, p. 47). Kaplan and Sadock (1998) note that it is unproductive to try and separate physical and psychological dependence from physiological factors as they reflect underlying changes in the brains behavioural centres. Jarvis (2004) suggests that a wider range of influences are involved in cigarette smoking. He proposes that a combination of social, economic, personal and political influences impact on smoking behaviour. While recognising the impact of dependence, Jarvis suggests that these other factors effect initiation, continuation and quit attempts. Batra (2004) while providing evidence to support a genetic model of dependence acknowledges the importance of considering social, psychological and biological factors, further supporting the evidence for the multi-factorial nature of dependence.

### *Disease Model of Addiction*

The predecessor of the biopsychosocial model was the disease model of addiction or the medical model. This model assumes that addiction is a medical disorder, presupposes a biological vulnerability to substances which results in a loss of control when the substance is used, and that the addiction is progressive (Doweiko, 2002). The disease model acknowledges that the factors that initiate substance use are different from those that maintain it. While an element of choice is apparent in the experimentation with any substance the disease model infers that the continuation of use is maintained by physical dependence as

defined by DSM-IV-TR or ICD-10 criteria. This requires the presence of psychopathology and recognisable symptoms in order to make a diagnosis. Tobacco chippers are proof that the use of nicotine is not a definitive indication of the presence of dependence. Dodgen (2005) states that the strengths of the model include the reduction in social stigma and the provision of empirically validated treatment goals. A major weakness is the minimisation of personal responsibility (Dar, 2002; Dodgen, 2005).

### *Addiction Theory – New Alternatives*

Hughes (2001) offers a new perspective on nicotine dependence based on current research and theory. He proposes that telling people they are addicted to nicotine is counterproductive (also Martin, 1990). Four major points underlie Hughes new approach. First, nicotine provides beneficial effects such as mood management, cognitive enhancement and weight control, all of which may be particularly important to adolescents. Second, cigarettes are easily accessible, legal and provide an almost instant reward. Third, chronic consumption does not lead to intoxication. And fourthly, the unexpected length of possible side effects following cessation undermines most quit attempts. The success rate for smokers who try to quit without formal help is less than 5% (American Psychiatric Association, 2000). Hughes explanations no way support cigarette smoking but suggest that the acknowledgment of these facts and education of smokers to these points could assist with quitting. His focus on the benefits gained from smoking is in direct contrast to most theories of dependence, which predominantly focus on the negative impact. Henningfield's (1985) research supports these findings suggesting that elucidation and acknowledgement of positive side effects can assist in the development of appropriate quit programmes and support relapse.

### *Personality*

The complex interaction between personality and substance use has been researched using various theories of personality. Eysenck's theory of personality will be used in this study to investigate the relationship between personality and cigarette smoking. Eysenck, postulates that smoking is linked

with personality (Eysenck, 1990). His research finds that the initiation of smoking is generally related to social factors such as peer interactions, though the continuation of smoking is related to personality. Personality and smoking will be discussed in Chapter Five.

## SUMMARY

While maintaining a level of underlying commonality the various theories of dependence further support the need to consider the initiation and maintenance of smoking as a multifactorial topic. It is evident from the various theories of dependence that a single measure is unlikely to be able to provide useful information unless it is measuring a wide range of domains. At this stage there is no single measure of dependence that can adequately provide a definitive measure of dependence. A review of the literature found that the measures, which are currently used for research, programme development and treatment generally measure a single characteristic of nicotine dependence.

## MEASURES OF DEPENDENCE

There is currently no gold standard for measuring nicotine dependence among adults (Di Franza et al., 2002) or adolescents (O'Loughlin, DiFranza, et al., 2002), although the Nicotine Dependence Syndrome Scale (NDSC) developed by Shiffman and Sayette (2005) shows promise. Measures of dependence variously include physiological adaptation, consumption rates, quit attempts, behavioural aspects and dependence as a mental disorder. This diversity in measurement may be explained by the multifactorial nature of nicotine dependence, which could account for the low concordance rates among various dependence measures (Hughes et al., 2004; Kawakami, Takatsuka, Inaba & Shimizu, 1999; Stanton 1995). The most commonly used measures of nicotine dependence include the Fagerstrom Test for Nicotine

Dependence (FTND) and DSM-IV-TR diagnostic criteria. More recently the Heaviness of Smoking Index (HSI), which is a short version of the FTND, has been recommended (Diaz et al., 2005). Although biochemical measures of nicotine dependence were not used in this study there is a research base, which provides evidence that smoking consumption is positively related to biochemical measures (Radzius et al., 2003).

### *Biochemical Measures*

Cotinine is a measurable by-product of nicotine metabolism that is commonly used to confirm or validate self-reported cigarette consumption (Heatherton, Kozlowski, Frecker, Rickert, & Robinson, 1989). Cotinine can be measured in blood, urine or saliva. Because cotinine has a half-life of approximately 20 hours and does not fluctuate as rapidly as nicotine levels it is a useful measure of nicotine consumption (Kozlowski et al., 2001). Although, ethnic differences in the rate of nicotine metabolism need to be considered, with evidence that "Whites" metabolising nicotine faster than "Blacks" or "Asians" (Benowitz, O. F. Pomerleau, C. S. Pomerleau, & Jacob, 2003). Biochemical measures reach a natural peak at which point further cigarette smoking will not increase results. Both cotinine and carbon monoxide (CO) do not differ for smokers who smoke 20 cigarettes per day compared to 30 or 40 cigarettes per day (Heatherton et al., 1989). Stanton (1995) compared salivary cotinine levels to cigarette consumption and DSM-III-R criteria for nicotine dependence. Results suggested that cotinine was positively correlated with cigarette consumption but not tobacco dependence as measured by DSM-III-R criteria. Prokhorov et al. (2000) found that the Heaviness of Smoking Index (HSI) scores were highly correlated with cotinine levels, indicating that in many cases the use of non-invasive self-report measures is a viable alternative to more complex biochemical testing. One of the more simple measures of dependence is a review of lifetime consumption.

### *Lifetime Cigarette Consumption*

Nicotine dependence may occur within a short time of smoking initiation. Woody et al. (1993) found that 80% of individuals who initiate smoking will meet DSM-IV criteria for low to medium dependence after using cigarettes only six or more times. While a similar result was found for cocaine, other substances such as opiates, heroin, alcohol, amphetamines and cannabis required longer-term use to meet substance dependence criteria. Woody et al. (1993) postulated that nicotine quickly produces dependence among a high percentage of smoking initiators. DiFranza et al. (2000) noted that adolescents may experience nicotine dependence before regular smoking is established. Corrigan et al. (2001) suggest that nicotine dependence among adolescence increases as a function of cigarette consumption but does not offer a cut-off point to identify nicotine dependence. Further investigation would be needed to confirm the factors which predispose an individual to continue smoking as opposed to becoming a non-smoker after initial experimentation. While the identification of nicotine dependence may rest on the life-time consumption of a set number of cigarettes, the degree of dependence seems to be correlated with the number of cigarettes consumed per day.

### *Heaviness of Smoking Index (HSI)*

The Heaviness of Smoking Index (HSI; Heatherton et al., 1989) is a self-report measure of nicotine dependence, which consists of two questions. It was derived from the Fagerstrom Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991), which was a revision of the Fagerstrom Tolerance Questionnaire (FTQ; Fagerstrom, 1978). The initial FTQ was an eight item self-report measure of nicotine dependence for cigarette smokers. With further research it was considered psychometrically deficient. A revision in 1991 led to the development of the FTND, which included a revised scoring schedule and retained only six questions (Heatherton et al., 1991). In 2004, Breteler, Hilberink, Zeeman, and Lammers concluded that the FTND did not measure a unidimensional construct. They identified three factors including physical dependence, compulsive smoking and social problems related to smoking. However their findings supported the use of the question regarding

“cigarettes per day” as an indicator of nicotine dependence. Radzius, in 2003 only reported two factors but concluded that the FTND measured a smokers nicotine intake.

Further investigation by Heatherton et al. (1991) regarding the validity of individual questions provided positive results. They found that two questions in particular; the ‘time to first cigarette of the day’ (TTF) and ‘average daily cigarette consumption’ (CPD) were strong predictors of biochemical measures of the heaviness of smoking. Heatherton, et al. (1991) found that TTF reflected the enduring levels of biochemical levels of cotinine, carbon monoxide (CO) and nicotine, where as the CPD related more to recent levels of these by-products. Higher levels of these biochemical products were found in those smokers who had the shortest time from waking to their first cigarette. High CPD scores were also related to higher biochemical markers.

Individuals who smoke soon after waking and consume higher numbers of cigarettes have greater difficulty in refraining from smoking (American Psychiatric Association, 2000) and are often found to be less successful in cessation programs (Kozlowski et al., 1981). Heatherton et al. (1991) suggested that CPD and TTF would provide a predictor of nicotine dependence that was easy to administer and non-invasive. More recently Prokhorov et al. (2000) validated this finding among adolescents with TTF and CPD highly correlated with cotinine levels. West (2004) noted that these two questions continue to be the most relevant to the measure of dependence.

Heatherton et al. (1991) concluded that the HSI could adequately distinguish nicotine dependence from non-dependence. Recent research has acknowledged the FTQ and its various developments as the most commonly used non-invasive measures of nicotine dependence today (Diaz et al., 2005; Strong et al., 2003; West, 2004). Dijkstra and Tromp (2002) postulated that the FTND and consequently the HSI are measures of physical dependence.

In 2002, A. S. Burling and T. A. Burling compared the use of the FTQ, FTND and HSI with male drug and alcohol dependent smokers. Their results showed that the HSI was the best measure of self-reported nicotine dependence of the three. The HSI uses four categories for scoring each of the two items, with each scored between zero and three (de Leon et al., 2002;

Etter, Vu Duc, & Perneger, 1999; Diaz et al., 2005). Scores greater than or equal to four indicate nicotine dependence. While not recommending a cut-off point for nicotine dependence, Burling and Burling (2002) found that high scores on the HSI were correlated to higher CO and cotinine levels, having smoked for longer at a higher smoking consumption rate and more smoking related physical symptoms. This related to the original scoring of the FTQ which showed that higher scores indicate a higher level of dependence and low scores a lower dependence, rather than no dependence (Shadel, Niaura, Geldstein, & Abrams, 2000; Teeson et al., 2002; West, 2004). For example, tobacco chippers would generally have low scores on the FTQ (Shiffman et al., 1994). Many New Zealand who smoke on average 14 cigarettes per day would also be classified as having low dependence.

Burling and Burling (2002) suggest that while the psychometric properties of the HSI and its derivatives are “modest” there is justification for using only the HSI if limited resources are available. Etter et al. (1999) suggested that the HSI could be improved by including questions regarding the experience of withdrawal symptoms, self-perceived dependence and the presence of failed quit attempts. This would be particularly relevant for light smokers who they define as smoking on average 12 cigarettes per day. The FTND continues to be the most commonly used measure of nicotine dependence in recent times (Kawakami et al., 1999; West, 2004). More recently the HSI has been validated as a measure for high nicotine dependence. Results showed good results for sensitivity (94%) and specificity (88%) when using a cut-off of  $\geq 4$  to indicate high nicotine dependence (Diaz et al., 2005). Caution should however be used when administering the measure to adolescents. Adolescents are less likely than adults to smoke their first cigarette within 30 minutes of waking (Colby et al., 2000a). Those who smoke against their parents wishes tend to smoke after they have left the house in the morning or on weekends when they socialise with friends (O’Loughlin, Kishchuk, et al., 2002). Using the time to the first cigarette as a measure of dependence is therefore likely to show varying results based on the smoker’s age.

*Diagnostic and Statistical Manual for Mental Disorders – Text Revision (2000)  
Criteria for Nicotine Withdrawal*

DSM-IV-TR and its predecessors provide recognised diagnostic criteria for nicotine dependence based on physiological and behavioural factors. The DSM-IV-TR currently provides the most commonly used definition of nicotine dependence (DiFranza et al., 2000). DSM criteria have been variously compared with cotinine levels (Stanton, 1995), craving (Riedel et al., 2003) and the FTQ (Kawakami et al., 1999). The DSM-IV-TR, provides criteria for identifying the presence of a withdrawal syndrome, which assumes the presence of nicotine dependence (Dodgen, 2005). In a sample of over 4000 Americans aged 15-54 years old, DSM-III-R criteria identified 24% of daily smokers as nicotine dependent (Breslau, Johnson, Hiripi, & Kessler, 2001). Recent research has identified negligible differences between, DSM-III-R and DSM-IV categorisation of dependence. When using the DSM-IV withdrawal symptoms as a measure of dependence, 85% of chippers noted experiencing less than a mild level of discomfort when refraining from smoking (Shiffman et al., 1994).

*Quit Attempts*

Around 80% of smokers would like to quit (Sabatol et al., 1999; Reeder, Williams, McGee, & Poulton, 2001). Asking current smokers whether they have tried to quit smoking in the past year may provide a very basic indicator of nicotine dependence. Colby et al. (2000b; O'Byrne, Paston, & Haddock, 2002; Health Canada, 2003) note that a persistent desire to quit smoking or unsuccessful quit attempts may indicate nicotine dependence. However John, et al. (2003) hypothesise that current smokers who have not tried to quit smoking may be more nicotine dependent than those who make an attempt. This is supported by Etter et al. (1999) who found that more dependent smokers were less likely to have made a quit attempt in the previous year. Approximately 1/3 of smokers will attempt to quit smoking every year (Jarvis, 2004). Of those who try around 3% will manage to stay smoke free for 12 months. In a US survey completed in 1991, 70% of smokers had quit for at least 24 hours in the previous year and 38% had remained smoke free for over

six months in a previous attempt to quit (National Advisory Committee on Health and Disability, 1999). On average smokers make four serious attempts to quit before they are successful. Relapse is a normal part of the process (Dodgen, 2005; National Advisory Committee on Health and Disability, 1999). The inconsistencies evidenced in these results suggest that the number of quit attempts made by a current smoker do not appear to offer a useful measure of nicotine dependence. The difficulty experienced by many smokers when attempting to give up smoking may be the strongest indication of dependence.

### *Cigarettes Per Day (CPD)*

Benowitz and Henningfield (1994) propose that an intake of five or more cigarettes per day provides a cut-off point for nicotine dependence. Although they caution that individual variation may identify dependence and non-dependence outside of this cut-off point. In a study undertaken by Stanton in 1995, smoking five cigarettes a day was significantly related to high salivary cotinine levels in adolescents. Similarly, Shiffman, Kassel, et al. (1994) found that smoking five or less cigarettes a day was insufficient to maintain significant blood levels of nicotine. Consumption level was also related to tobacco dependence with higher consumption relating to increased prevalence of dependence (Stanton 1995). Gilbert (1980) used a cut-off for inclusion in his research in introversion/extraversion and smoking, of six or more cigarettes per day. There was no discussion supporting this decision, and dependence was not a test variable. Benowitz (2001) found that heavy smokers who try to quit often manage to cut down to ten cigarettes per day but have difficulty reducing this consumption any further. This was thought to be due to the ability at this level to absorb enough nicotine to sustain nicotine addiction. While all of these numeric indicators of nicotine addiction are generally inconsistent there is evidence to support a usage threshold when individual variation such as body size and metabolism are taken into consideration.

### *Validity of Nicotine Dependence Measures*

The measurement and diagnosis of nicotine dependence has historically been based on the DSM-IV-TR diagnostic criteria and the various derivatives of the FTQ. The research seems to indicate that these assessments are measuring different factors of smoking behaviour (Moolchan et al., 2002). Cigarette smoking has a long and contentious history. The main finding of the previous review of the literature is that there is no real consistency either in assessment, diagnosis or measurement of nicotine dependence.

Colby et al. (2000b) suggest that nicotine use and nicotine dependence are conceptually different. A linear relationship may be found between factors such as consumption and withdrawal. However tolerance may be linear with consumption among light smokers yet reach a threshold among heavy smokers which results in no increase in tolerance. The number of quit attempts may be consistent irrespective of consumption.

While there is no disputing that use is a precursor to dependence the correlations between dependence and other factors need to consider multidimensional trajectories. Whether the practitioners are trying to assess individuals for diagnosis and treatment or researchers are trying to investigate the various factors that underlie the behaviour of smoking, it appears that the consensus is to use the most commonly used measures. The evidence supports the multifactorial nature of nicotine dependence. Perhaps the clearest indication is that individual measures, which assess a single dimension of smoking behaviour, will continue to provide low rates of concordance among results.

Colby et al. (2000b) proposed that the ideal measure of nicotine dependence for adolescents would include DSM-IV dependence criteria, a FTQ type questionnaire, craving, smoking history and current nicotine exposure. The time and training that would be required in order to administer such a measure is perhaps the best reason for its not having been developed to date.

## SUMMARY

Cigarette smoking is a major health issue throughout the world. Whether the cost is measured financially, socially or in health terms the outcome is overwhelmingly negative. A long history of research into the factors that are involved in the initiation and continuation of cigarette smoking has not provided the ability to eradicate its use. Despite the low rate of success in determining the best way to prevent initiation and assist cessation the chance of small gains provides the best reason for continuing.

## Chapter 4

### PERSONALITY

#### PERSONALITY THEORIES

##### *Personality Defined*

According to Kaplan and Sadock, personality is “a person’s characteristic totality of emotional and behavioural traits apparent in ordinary life, a totality that is usually stable and predictable” (1998, p. 775). In 1937 Gordon Allport completed a study that identified 50 different definitions of personality (Hall, Lindzey, Loehlin, Manosevitz, & Locke, 1985). Given that no single definition of personality is accepted within the field of psychology it is helpful to identify and work from the basis of a definition of personality that relates to the theory under investigation. A large number of theories of personality have been proposed throughout the history of psychology (see Hall et al., 1985, for a review). In general personality theories fall under one of four categories. These include psychodynamic, humanistic, social-cognitive and trait theories (Morris, 1996). Theorists who focus on the enduring characteristics of personality hypothesised that personality is stable and enduring thereby allowing measurement of individual differences. These theories, commonly known as trait or type theories generally vary on the number of factors considered necessary to describe individual differences and the model used to explicate personality dimensions.

##### *Three, Five or Eight Factors of Personality?*

The major difference between the various trait theories of personality included in research to date is the number of higher order factors deemed necessary to describe individual differences (Morris, 1996). Eysenck postulates a three-factor model, whereas Costa and McCrae propose a five-factor model (Aluja, Garcia, & Garcia, 2004). While Eysenck’s model includes Extraversion (E), Neuroticism (N) and Psychoticism (P), Costa and McCrae argue that the

factors that form personality include Extraversion, Neuroticism, Agreeableness, Conscientiousness and Openness to Experience or Culture (Saggino, 2000).

Historically many models have agreed on the role of Extraversion and Neuroticism as the main dimensions of personality. The main differences appear to involve the role of additional factors. Eysenck postulates that these disputed factors correspond to traits or lower order factors rather than personality dimensions. Alternatively Costa and McCrae propose that the P, E and N factors can be accounted for by their five factor model (Costa & McCrae, cited in Shadel, Niaura, et al., 2000). Aluja et al. (2004) note that Agreeableness and Conscientiousness may be a negative pole to Psychoticism, whereas Openness to Experience is contained in the dimension of Extraversion. Research into the structure of personality continues. The main focus continues to be the higher order factors. Using structural equation modelling Aluja et al. found that neither the three or five factor models of personality were superior.

In 2002, Vollrath and Torgersen proposed a model of personality that comprised various combinations of Eysenck's three personality dimensions. Individuals were categorised as either high or low on P, E and N, which led to the explication of eight personality types. While current research investigates the measurement and understanding of personality, the knowledge gained from previous research such as that undertaken by Eysenck in the 1940's continues to provide the basis for further investigation, as evidenced by the Vollrath and Torgersen model. The model used in this study will be Eysenck's theory of personality.

## EYSENCK'S THEORY OF PERSONALITY

### *Personality Defined*

Eysenck defines personality as "the sum total of the actual or potential behaviour-patterns of the organism" (Eysenck, 1955, p. 25) however he also bases his work on the premise that personality is determined by hereditary and environment and is further developed through interactions between an individual's intelligence, character, temperament and physical characteristics.

Using empirical research Eysenck set out to discover a model of personality that would allow description and measurement of individual differences, based on observable behaviour. Eysenck conceptualised personality as the “non-cognitive aspects of behaviour” whereas other personality theorists such as Cattell included the dimension of intelligence (Eysenck, 1990, p. 193). Eysenck (1967) asserted that an individual’s personality can be understood as a cluster of intercorrelated traits, which form three main personality dimensions. Each of Eysenck’s dimensions was comprised of a continuous scale on which individuals scored at a point along the continuum. Personality extremes were hypothesised to sit at either end of the continuum, with the majority of individuals clustering towards the middle. While earlier research identified only two dimensions namely Extraversion-Introversion (E) and Neuroticism (N) a further dimension labelled Psychoticism (P) was hypothesised in 1952 (Gibson, 1981). Each individual personality dimension was made up of four levels of behaviour structured in a hierarchical format.

#### *Hierarchical Model of Personality*

Eysenck’s hierarchical model involved four levels, moving from a broad base of behaviours at the lowest level of the hierarchy, through recognisable personality traits, to a single personality type or dimension (Eysenck 1947, cited in Eysenck & Eysenck, 1969). All four levels of the model were based on behavioural responses.

The lowest level of the hierarchy involved “one off” responses and included atypical behaviours. These behaviours were considered the equivalent of an error factor (Gibson, 1981). Eysenck (1990) distinguished this lowest level of the hierarchy as being comprised of “states”, whereas the remaining three levels depicted traits and types. A state was considered a “singular occurrence” of a behaviour, whereas a trait consisted of a “dispositional factor that regularly and persistently determined conduct in many different situations” (Eysenck, 1990, p. 197).

The second lowest level of the model included behavioural responses, which were more habitual or predictable. This level involved behaviours that

were likely to recur in similar circumstances. Eysenck and Eysenck (1969) found that this degree of predictability allowed measurement of behavioural responses using reliability coefficients.

Traits made up the third level of the hierarchy. Together these traits formed the highest level of the hierarchical system that of a "type" or personality dimension. A type was defined as a "higher order construct" formed by the intercorrelations of traits (Eysenck & Eysenck, 1969, p. 41). Eysenck & Eysenck (1969, p. 12) stated, "types are based on constitutional, genetic, or inborn factors which are to be discovered in the physiological, neurological and biochemical structure of the individual". The three types became known as Extraversion, Neuroticism and Psychoticism.

#### *Extraversion-Introversion (E)*

The following description of a typical Extravert was originally reported by Eysenck and Eysenck in their 1969 book *Personality Structure and Measurement* and was then reproduced in its entirety for use in the *Manual of the Eysenck Personality Scales* (1991). Research undertaken in the intervening years did not change any features of the definition. In order to maintain the empirical continuity of these very specific definitions, the three dimensions are included in their entirety:

The typical extravert is sociable, likes parties, has many friends, needs to have people to talk to, and does not like reading or studying himself. He craves excitement, takes chances, often sticks his neck out, acts on the spur of the moment, and is generally an impulsive individual. He is fond of practical jokes, always has a ready answer, and generally likes change; he is carefree, easygoing, optimistic, and likes to laugh and be merry. He prefers to keep moving and doing things, tends to be aggressive and lose his temper quickly; altogether his feelings are not kept under tight control, and he is not always a reliable person.

(Eysenck & Eysenck, 1969, p. 118)

At the opposite end of the extraversion-introversion continuum is the introvert.

The typical introvert is a quiet, retiring sort of person, introspective, fond of books rather than people; he is reserved and distant except to intimate friends. He tends to plan ahead, 'looks before he leaps' and distrusts the impulse of the moment. He does not like excitement, takes matters of everyday life with proper seriousness, and likes a well-ordered mode of life. He keeps his feelings under close control, seldom behaves in an aggressive manner, and does not lose his temper easily. He is reliable, somewhat pessimistic, and places great value on ethical standards.

(Eysenck & Eysenck, 1991, p. 4)

*Neuroticism – Emotionality or Stability-Instability (N)*

High N scores are thought to relate to neurosis. Due to the negative connotations of the term 'neuroticism' this dimension was renamed emotionality or stability-instability. A high scorer on N is likely to be described as:

Anxious, worrying, moody, frequently depressed, sleeps badly, suffers from various psychosomatic disorders, overly emotional, reacts too strongly to all sorts of stimuli, finds it difficult to get back on an even keel after each emotionally arousing experience, strong emotional reactions interfere with proper adjustment, making reactions irrational and sometimes rigid.

(Eysenck & Eysenck, 1991, p. 4)

A low N scorer can be described as:

Tends to respond emotionally only slowly and generally weakly, and to return to baseline quickly after emotional arousal; he is usually calm, even-tempered, controlled and unworried.

(Eysenck & Eysenck, 1991, p. 4)

The neurophysiological basis for this description was based on the understanding of the autonomic nervous system and emotional impulses. Eysenck postulated that the fight or flight reaction or arousal of the sympathetic nervous system was overactive in individuals scoring high on N. Individuals with this personality type were thought to react too readily to stimuli with responses of fear and alarm (Gibson, 1981).

*Psychoticism – Tough-mindedness-Tender-mindedness (P)*

Psychoticism (P) was the last of the personality dimensions to be included in Eysenck's Theory, and was thought to underlie psychosis. This dimension was considered orthogonal to N (Eysenck & Eysenck, 1969, p. 57). The Manual of the Eysenck Personality Scales (1991) suggested the use of the terminology tough-mindedness and tender-mindedness when discussing the personality dimension with "lay persons". The traits which comprise the psychoticism dimension included being "hostile, cruel....lack of personal involvement, the lack of human feeling" (Eysenck, 1973, p. 79). A more recent definition of the psychoticism dimension used in the P scale of the EPQ-R to define high P scorers included the following traits:

...solitary, not caring for people; troublesome, not fitting in anywhere, cruel, inhumane, lacking in feeling and empathy, insensitive, hostile to others - even own kin, aggressive - even to loved ones, likes odd and unusual things, disregard for danger; likes to make fools of other people, and to upset them, lacks empathy, feelings of guilt , insensitive to other people.

(Eysenck & Eysenck, 1991, p. 6).

The Manual of the EPQ-R notes that extremely high psychoticism scores would correlate with the psychological terms such as “schizoid and psychopathic; behaviour disorders” (Eysenck & Eysenck, 1991, p. 6). While the definition of P implies a high level of mental illness, Eysenck cautioned that high scores were more of an indication of a predisposition to illness and that only a small number of individuals would develop psychoses.

### *Personality Dimensions and Individual Differences*

Based on personality testing using the Eysenck Personality Questionnaire Revised (1991) individuals were allocated a position on the three dimensions of E, N and P (Gibson, 1981). High scores do not necessarily indicate mental illness but may denote an increased chance of pathology under stressful conditions, particularly in the case of neuroticism. Eysenck maintained that the extremes of his dimensions should “indicate a criterion group of people whose special characteristics give validity to the nature of the dimension” (Gibson, 1981, p. 127). Individual scores on a particular dimension are likely to remain relatively stable throughout the lifespan. Although exceptions have been found with individuals who experience extremely traumatic social environments, such as being in a concentration camp (Eysenck, 1990). While normal individuals may score highly on individual dimensions the groups with diagnosed illnesses consistently score highly.

### *Psychometric Characteristics of the E, N and P Scales*

While the E scale is normally distributed and the N scale approximates a normal distribution, the P scale is noticeably skewed with many more low scorers than high scorers (Eaves, Eysenck, & Martin, 1989; Ferrando, 2003). The majority of the population score in the intermediate range for the E and N scales and are identified as ambiverts. While the labels for these factors may vary between theories, three dimensions of personality are consistently found when using factor analysis. Further studies have shown that these factors are supported both cross-culturally and across major personality instruments (Eaves, Eysenck, & Martin, 1989). As recently as 2003, Ferrando used item

response theory to investigate the distribution of the E, N and P scales using a large university population in Spain. The distributions were found to be unimodal and approximately bell shaped. However Ferrando supported Eysenck's finding that P is asymmetrical. Eysenck and Eysenck (1991) remind us that the P scale is a measure of non-conformity and high scorers show traits of a lack of co-operation with questionnaire completion. The traits being measured by the P scale show a marked difference from those of the E scale, which measures such traits as sociability and activity. The conclusion drawn from this disparity is that P scores are likely to be less reliable than E or N, due to nature of the traits involved.

*Physiological Differences between Extraversion, Neuroticism and Psychoticism*

The Manual of the EPI (Eysenck & Eysenck, 1964) outlines the relationship between the biological determinants of personality for E and N. Extraversion is related to "the degree of excitation and inhibition prevalent in the central nervous system" and N is related to "the inherited degree of lability of the autonomic nervous system" (Eysenck & Eysenck, 1964, p. 7). These findings relate to cortical arousal. Eysenck postulated that underactivity of the ascending reticular activating system leads to extraverted behaviour in order to increase stimulation (Eysenck, 1990). Therefore, extraverts are sensation-seeking due to low arousal of the cortex which results in their becoming bored. In contrast, introverts experience higher levels of cortical arousal resulting in avoidance of additional external stimuli. Introverts react strongly to external stimuli and therefore avoid additional stimulation such as social contact. A similar finding has not been found for P. Eysenck used neurophysiological research to argue that "neurophysiological structures affect both personality and social behaviour" (Eysenck, 1967, p. 39), allowing that a degree of personality is predicted by biological determinants. However he acknowledged that a predisposition to a particular personality style was modified by an individual's environment.

### *Heredity and Personality*

Eysenck investigated the impact of heredity on personality in much of his early work. He stated that "it has amply been demonstrated that extraversion, neuroticism and psychoticism show a powerful independent hereditary determination" (Eysenck, 1964, p. 26). This was supported by research, which found that the personality dimensions of extraversion and neuroticism were highly correlated between twins, irrespective of whether they had been raised together or apart (Eysenck, 1964). Based on a review of the literature and his own research Eysenck concluded that approximately three quarters of the differences between individuals on the dimensions of E and N were attributable to hereditary (Eysenck & Eysenck, 1969). Later in 1989, Eaves, Eysenck, and Martin found that environmental effects were responsible for approximately half of the personality variation among twins and siblings within families. Their twin studies found that while the shared family environment played a significant role in social attitudes it was not so important in personality development. They also stated that "twins and siblings in the same family had their own unique experiences that contribute to their personality" (Eaves, Eysenck, & Martin, 1989, p. 407) and noted that the shared family environment had a minimal impact on higher order factors. While continuing investigation into the physiological and heritable factors of personality Eysenck was simultaneously developing a measure of personality based on his theories.

### MEASUREMENT OF PERSONALITY

The measurement of personality has a long and contentious history in the field of psychology. Assessment is closely related to the underlying theory on which the measure has been developed and may involve personal interviews and observation, as well as objective and projective tests. Personality assessment of trait theories commonly involves objective tests such as the Sixteen Personality Factor Questionnaire (16PF), the Minnesota Multiphasic Personality Inventory -2 (MMPI-2) and the Eysenck Personality Questionnaire-Revised (EPQ-R). While the MMPI-2 remains the most commonly used self-

report measure of personality it contains a total of 704 questions, furthermore the 16PF has a total of 374 questions. A further concern with objective personality tests was the self-report nature of the information provided and the opportunity for participants to respond in a socially desirable manner. In order to manage this concern a Lie scale was added to the measures in order to check the validity of responses. Due to the limited resources available for this study it was decided to use the EPQ-R because of its comparatively small number of questions and its inclusion of a Lie scale.

#### *The Development Of The Eysenck Personality Questionnaire-Revised*

The Eysenck Personality Questionnaire-Revised (Eysenck & Eysenck, 1991) is a 106 item self-report measure requiring yes and no responses. Scores are calculated for each of the three personality dimensions. Individual results enable comparison to a criterion group including normal individuals. Extreme scores on the various dimensions are more likely to match a pathological population (Eysenck & Eysenck, 1991).

The EPQ-R is the result of 40 years of research. Eysenck and Eysenck (1991) with the support of many colleagues underpin the findings of the EPQ-R with empirical research through the use of psychophysiological, biochemical and experimental methods. The original questionnaire was developed in 1952 and named the Maudsley Medical Questionnaire. This 40-item scale measured the dimension of N. The E dimension was added in 1959. By 1964 the measure was renamed the Eysenck Personality Inventory (EPI) and included the introduction of the Lie (L) scale to measure dissimulation. In 1975 the Eysenck Personality Questionnaire (EPQ) was released including an additional scale to measure the P dimension. The current EPQ-R including the newly developed Addiction Scale was released in 1991.

#### *The Cultural Validity of the Eysenck Personality Questionnaire - Revised*

The EPQ-R has been translated for use in many different countries. Sybil Eysenck administered the EPQ in 35 different countries in a variety of languages (Eysenck, 1990). While the intercorrelations between countries for

the three main personality dimensions was .98, differences were found between countries on the average scores for each dimension. For example Japanese participants scored higher on E and N than Americans (Eysenck, 1990). In a study involving 37 nations Lynn and Martin (1997) found support for the use of the EPQ-R internationally. Gender differences were found to be reasonably consistent among the 37 countries for N (women scored higher than men), 34 countries for P (men scored higher than women), and 30 countries for E (men scored higher than women). In contrast Australian, French, Mexican, Japanese and American women scored significantly higher than men on E (Lynn & Martin, 1997). The EPQ was used in 1988, to study its relevance to a New Zealand population (McKerracher, Rich, & Niven). McKerracher et al. concluded that the EPQ was appropriate for use with a New Zealand Population. The EPQ-R continues to be used in more recent research (Aluja, Garcia, & Garcia, 2004; Ferrando, 2003; Joseph, Manafi, Iakovaki, & Cooper, 2003; Kawakami, Takai, Takatsuka, & Shimizu, 2000; Shatz, 2004).

#### *Eysenck Personality Questionnaire-Revised – Lie Scale*

A Lie scale (L) was included in the EPQ-R to measure the degree to which some individuals may “fake good” in order to make a good impression (Eysenck & Eysenck, 1991). The scale is now more commonly known as the social desirability scale. Impression management is thought to occur when an individual attempts to answer questions in such a way as to appear more socially desirable. This type of response pattern or test falsification is more likely to occur in situations where results have an impact on outcome, such as in job interviews or for university credit. Eysenck & Eysenck (1991, p. 13) found that while the L scale had good factorial unity it was also measuring “social naivety or conformity”. This additional component was thought to constitute a stable personality factor. Jackson and Francis (1999, p. 60) summarised the scale as measuring either “social acquiescence” or a “lack of insight” and confirmed previous findings that the L scale measures faking good. In order to check the validity of the scale Eysenck and Eysenck (1991) designed an experiment which required groups of students to complete the EPQ-R under one of three conditions. These included standard conditions, answering in a

dishonest manner, and answering to create a “favourable” impression. The resulting scores confirmed the ability of the L Scale to detect faking good at a highly significant level.

Eysenck and Eysenck (1991) suggest correlations between the L and N scales should be investigated in order to achieve a better understanding of the L scores. When there is an obvious reason for individuals to fake good, the correlation between L and N scores is moderate, whereas situations of low motivation to fake good result in little or no correlation between L and N scores. When the correlation between L and N scores is high it is suggested that the top 5% of individuals be screened out. Investigation of the variability of these results compared to the overall data would indicate whether the top portion of dissimulators should be removed from the data set. The original L Scale of the EPI specified that a cut-off score of 10 or more indicated that ‘faking good’ on the E and N scores should be further investigated.

## MEASUREMENT OF THE ADDICTION TRAIT

### *Eysenck Addiction Scale*

Gossop and Eysenck added an Addiction Scale to the EPQ-R in 1980. Item analysis was used to identify those items of the questionnaire that differentiated drug addicts from normal subjects (Eysenck & Eysenck, 1991). The Scale differentiated male participants, although the results for females were not as consistent. In 1991 the Manual of the EPQ-R reported the results of a number of studies using the Addiction Scale. These included participants with bulimia, anorexia, problem drinking, drug addiction and prisoners (Eysenck & Eysenck, 1991). Ongoing research with pathological gamblers and heroin addicts found higher N, P and EPQ addiction scores than controls (Blaszczynski, Buhrich, & McConaghy, 1985). Davies and Claridge (1998) using the Addiction Scale to research eating disorders found that both anorexic and bulimic participants had high Addiction Scale scores. This was in contrast to findings by De Silva and Eysenck (1987) who found support for high addiction

scores among participants with bulimia but not anorexia. Since this time very little research has included the Addiction Scale, and none appear to have investigated the interaction between smoking and addiction scores.

*The Eysenck Personality Questionnaire-Revised as a Research Tool*

A number of recent studies into nicotine dependence and smoking behaviour have measured P, E, N and L, but have not included the Addiction Scale (Arai, Hosokawa, Fukao, Izumi, & Hisamichi, 1997; Canals, Blade, & Domenech, 1997; Joseph et al., 2003; Kawakami et al., 2000; Papakyriazi & Joseph, 1998) although the Addiction Scale has been available since 1991. Studies investigating personality dimensions using the EPQ-R, in association with addictive behaviours, have also failed to consider the Addiction Scale. For example smoking motivation (Joseph et al., 2003), alcohol and drug use (Sigurdsson & Gudjonsson, 1996), personality and hallucinogens (Nishith, Mueser, & Gupta, 1994), smokeless tobacco (Spielberger, Reheiser, Foreyt, Poston, & Volding, 2004) and smokers and ex-smokers (Patton, Barnes, & Murray, 1993). The Addiction Scale does not appear to have been used to compare smokers and non-smokers in any studies to date.

SUMMARY

Personality is a complex multidimensional characteristic that can generally be described in another individual when observing their behaviour but is extremely difficult to quantify. Although the study of personality has a long history there is no single commonly accepted definition of personality. While the four main theoretical approaches have converged to increase our understanding of personality the various forms of measurement maintain their individual theoretical stance. In order to minimise the time commitment of the participants in this study it was decided to use an internationally recognised personality measure which provided a sound base of empirical research and included a Lie Scale to minimise the impact of participant impression management. As previously discussed the EPQ-R provides a solid research base and can be administered within a relatively short period of time. An

additional benefit was the opportunity to score the Addiction Scale, which had previously been used to distinguish substance users from controls but had not been used to distinguish smokers from non-smokers.

## Chapter 5

### PERSONALITY AND SMOKING

Investigating why people smoke is a primary concern for many health psychologists (Papakyriazi & Joseph, 1998). While social and environmental factors have been identified as important in the initiation of smoking, the factors that contribute to the maintenance of smoking have been harder to establish. A relatively small number of studies have investigated the link between smoking and personality (Papakyriazi & Joseph, 1998).

#### *Eysenck's Theory of Smoking*

Eysenck hypothesised that individual differences in smoking behaviour were related to personality differences (Eysenck, 1990). Therefore extraverts would smoke in order to achieve stimulation and reduce boredom by increasing cortical arousal, whereas individuals high on neuroticism or anxiety would smoke in order to reduce tension. The apparent anomaly in this theory was explained by the fact that nicotine was found to have different effects dependent on the rate of consumption. In smaller doses nicotine was shown to act as a stimulant by reducing boredom, whereas larger doses reduce anxiety (Doweiko, 2002; Eysenck, 1990; Spielberger, 1986). This resulted in nicotine decreasing cortical arousal when it is high and increasing cortical arousal when it is low (Gilbert, 1980). Gilbert completed a follow-up study in 1980 to investigate the relationship between introversion and reasons for smoking. The results were consistent with Eysenck's findings. The relationship between P and smoking was hypothesised to have a more social basis. Individuals high in psychoticism were thought to smoke more than individuals with low scores on this dimension due to the social reinforcement of the negative stereotype associated with smoking (Patton et al., 1993; Spielberger et al., 2004).

### *Smoking and Personality Traits*

Research investigating the interaction between the EPQ personality dimensions and smoking has yielded a variety of outcomes. Smokers have been found to be more extraverted and to have higher scores on the P scale (Lopez, Barcelona, de Psicologia, & Maldonado, 2001) and the N scale among adolescents (Byrne, Byrne, & Reinhart, 1995). Byrne et al., (1995; Spielberger & Jacobs, 1982) recommend carrying out separate analyses by gender when researching smoking.

Gilbert, (1995, as cited in Shadel, Niaura et al., 2000) undertook a review of the relationship between the personality dimensions of E, N and smoking variables. Of the 100 studies, 65% involving E and 49% involving N found higher scores for smokers than non-smokers. The remaining findings were either diametrically opposed or ambiguous. Joseph et al. (2003) summarised a number of studies to conclude that smokers generally have higher P, E and N scores than non-smokers. Although they concluded that personality factors alone cannot account for smoking maintenance. Spielberger and Jacobs (1982) concluded that smoking initiation and maintenance were determined by different personality factors. While a large number of studies have investigated the relationship between personality dimensions, smoking variables and treatment, few have looked at the relationship between personality and smoking dependence (Shadel, Niaura et al., 2000).

### *Personality Theory and Smoking – Eight Personality Types*

Personality is a major determinant of an individual's predisposition to engage in risky behaviour (Vollrath & Torgersen, 2002). Vollrath and Torgersen proposed a model of personality comprised of eight personality types. These types were based on a combination of various high and low scores of E, N and P. Smoking, drunk driving, unsafe sex and excessive alcohol and drug use were correlated to these personality types and predicted health risk behaviours. The results showed that the types named Insecures ( $\downarrow E, \uparrow N, \downarrow P$ ) and Impulsives ( $\uparrow E, \uparrow N, \downarrow P$ ) smoked the most. These results mimic Eysenck's findings related to cortical arousal (Patton et al., 1997). Vollrath and Torgersen (2002) propose

that the aggregation of Eysenck's individual dimensions into eight types more accurately replicates individual personalities. Patton et al. (1997) found that the correlation between individual personality dimensions and smoking was weak and suggested that the heterogeneity of smokers may be to blame. Research using the EPQ-R considers outcomes in terms of the three individual personality dimensions. The model proposed by Vollrath and Torgersen (2002) may constitute a more accurate interaction among personality dimensions and should be considered for future research.

### *SUMMARY*

While the Addiction Scale has been used in previous research involving a variety of addictions no studies were found in which the Addiction Scale had been used to investigate the relationship between smokers and non-smokers. It was hypothesised that smokers would score higher on the Addiction Scale than non-smokers. A second goal was to identify the relationship between extraversion, neuroticism and psychoticism as measured by the EPQ-R, and smoking status. On the basis of previous research findings it was expected that smokers would score higher on all three personality scales of the EPQ-R. The relationship between various smoking measures was expected to be minimal. Self-perceived nicotine dependence is infrequently investigated and the proposed outcomes of this relationship were unclear.

Therefore the goals of this study were to:

1. investigate the utility of the Eysenck Addiction Scale in differentiating smokers from non-smokers,
2. identify the personality factors that distinguish smokers from non-smokers,
3. examine the concordance between different measures of nicotine dependence and
4. compare self-perceived nicotine dependence to established measures of nicotine dependence.

## Chapter 6

### METHODOLOGY

#### *PARTICIPANTS*

A convenience sample of 120 undergraduate students enrolled in a first year introductory psychology paper was utilised (Table 1). Participants were predominantly female (67.5%) and the average age was 26.9 years ( $SD = 11.16$ ). Ages ranged from 17 to 58 years. The majority of participants were European 77.5%, with Asian participants constituting the next largest group at 5.8% and Maori at 4.2%. No participants were of Pacific Island origin and a large number of participants (12.5%) described themselves as a "New Zealander" or "other".

Due to ethical committee concerns statistical calculations were not undertaken on individual ethnic groups.

Twenty percent (20%) of the sample smoked daily. A further 8.3% identified themselves as occasional smokers. Occasional smoking was defined as not smoking cigarettes every day but smoking at least weekly. More than half (53.3%) of the participants indicated that they were non-smokers, with an additional 18.4% identifying themselves as former smokers. A large percentage of participants (65.3%) identified themselves as being on a low income.

In summary, participants were therefore predominantly young European/Pakeha non-smoking female students who consider themselves to be on a low income.

Table 1

*Participant Characteristics (N = 120)*

	Frequency	Percentage
Gender		
Male	37	(30.8)
Female	81	(67.5)
Missing	2	(1.7)
Age		
21 >	63	(52.5)
22 ≤	57	(47.5)
Ethnicity		
European/Pakeha	93	(77.5)
Maori	5	(4.2)
Asian	7	(5.8)
Other	15	(12.5)
Income		
Low/Beneficiary	77	(64.2)
Middle-High	41	(34.1)
Missing	2	(1.7)
Smoking Status		
Non-smoker	64	(53.3)
Daily smoker	24	(20.0)
Occasional smoker <sup>1</sup>	10	(8.3)
Former smoker	22	(18.4)

<sup>1</sup> Occasional smoker – smokes cigarettes less than daily

## PROCEDURE

Prior to the research being undertaken an application was presented to the Massey University Human Ethics Committee (MUHEC). The application outlined the aims of the project and included the topics of participant privacy, confidentiality and informed consent. A copy of the Information Sheet (Appendix A) provided to participants was also attached. Approval was granted for the research to be undertaken, with the proviso that no inferences be made using ethnicity data, specifically in relation to Maori participants.

The lecturer presented an outline of the study to the class a week before the research was to be undertaken. Students were informed that participation was not a class requirement. The following week students who wished to participate were asked to remain in the room at the end of a class while the lecturer withdrew. The researcher informed the remaining students that participation was voluntary and consent would be deemed given if completed questionnaires were returned.

Information Sheets and Questionnaires (Appendix B) were distributed to all volunteers. Blank envelopes were provided for those participants who wished to receive a Feedback Sheet (Appendix C). Students wrote their name and address on the envelope. Envelopes were separated from Questionnaires in order to maintain anonymity. The Questionnaire took approximately 15 minutes to complete. The researcher was not personally acquainted with any of the participants.

The researcher completed all data entry and Questionnaires are stored in a locked file at the Psychology Department at Massey University Albany Campus. In accordance with (MUHEC) requirements, data are stored for five years and destroyed. Feedback Sheets were sent to all participants who returned self-addressed envelopes.

## *MEASURES*

An anonymous self-report questionnaire was constructed which included four sections. These included demographic variables, smoking characteristics, nicotine dependence measures and a personality questionnaire including an Addiction Scale. The various sections are described below.

### *Demographic Variables*

Demographic variables included gender, age and ethnicity (European, Maori, Pacific Islander, Asian or other). Participants were asked to indicate the group they most strongly identified with. Income was categorised into low income/beneficiary, middle income, moderately high or high income. The

income data were collapsed to a dichotomous variable due to the small number of participants identifying themselves as being on a moderately high (8.5%) or high income (2.5%).

### *Smoking Characteristics*

Smoking history examined the participant's current smoking status (non-smoker, daily, occasional or former smoker). All participants irrespective of their current smoking status were asked whether they had "ever tried cigarette smoking – even a puff?" and if so "how old were you?" Current and former smokers were asked at what age they had started smoking regularly and whether they considered themselves to be nicotine dependent. The number of cigarettes smoked per day or week and the number of previous quit attempts were also investigated. Current smokers were asked to consider the previous year. Former smokers were asked to refer to the year prior to cessation (Kawakami, Takai, et al., 2000).

### *Nicotine Dependence Measures*

*Heaviness of Smoking Index.* The Heaviness of Smoking Index is a short self-report measure of nicotine dependence (HSI; Heatherton, Kozlowski, et al., 1989). It consists of two questions that measure craving and consumption (Table 2). Further research has found that HSI results correlate with biochemical measures of cigarette consumption. The two questions are known as "time to first" (TTF) and "cigarettes per day" (CPD).

The HSI utilises four categories for scoring each of the two items, with each scored between 0 and 3 (de Leon et al., 2002). Scores greater than or equal to four indicate high nicotine dependence whereas scores less than four indicate low dependence. The HSI was found to be equally valid in both male and female samples (Diaz et al., 2005). With more recent research indicating a good level of sensitivity and specificity, the HSI is increasingly being recommended as a brief cost-effective screening tool for assessing high nicotine dependence among cigarette smokers (Diaz et al., 2005).

Table 2

*Heaviness of Smoking Index*<sup>1</sup>

1. How soon after you wake up do you smoke your first cigarette? (TTF)	
Answer	Points
≤ 5 minutes	3
6-30 minutes	2
31-60 minutes	1
> 60 minutes	0
2. How many cigarettes per day do you smoke? (CPD)	
Answer	Points
≤ 10	0
11-20	1
21-30	2
≥ 31	3
Score ≥ 4 defines high nicotine dependence (de Leon et al., 2002; Diaz et al., 2005)	

<sup>1</sup> Heatherton et al., 1989

*Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)* diagnostic criteria for nicotine withdrawal. The questionnaire investigated whether the participants had ever met the criteria for nicotine withdrawal as outlined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR, 2000). This requires the daily use of nicotine for at least several weeks and the presence of four or more diagnostic symptoms within 24 hours of discontinuing smoking. Current and former smokers were asked to indicate from a list of eight symptoms which symptoms they had ever experienced after a 24-hour period of smoking abstinence (Madden et al., 1997). Items were scored as being present or absent and summed to indicate whether this diagnostic criterion was met.

The physiological and behavioural symptoms included “depressed mood, insomnia, irritability or frustration, anxiety, difficulty concentrating, restlessness, decreased heart rate and increased appetite or weight gain” (American Psychiatric Association, 2000, p. 266). The Diagnostic and Statistical Manual of

Mental Disorders (2000) withdrawal criteria have previously been used to infer the presence of nicotine dependence (Cuijpers & Smit, 2002).

*Quit attempts.* Participants who were current smokers were asked whether they had ever tried to quit smoking. If they answered yes to this question they were asked how many times they had tried to quit in the previous year. Former smokers were asked how many times they had tried to quit smoking in the year prior to cessation. Questions regarding the number of quit attempts made by smokers have previously been included in research investigating cigarette smoking (Colby et al., 2000b; Etter et al., 1999; John et al., 2003). There is evidence in the literature that quit attempts may offer further information regarding nicotine dependence although the findings to date are inconclusive.

*Self-perceived nicotine dependence.* All of the participants who indicated that they were occasional, daily or former smokers were asked whether they currently, or in the case of former smokers, previously, had considered themselves nicotine dependent prior to cessation.

#### *Eysenck Addiction Scale.*

The Addiction Scale (Gossop & Eysenck, 1980, cited in Eysenck & Eysenck, 1991) consists of 32 items, which are drawn from the P, E, N, and L Scales of the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1991). The scale includes thirteen items from the N scale, nine from P, six from the L scale and four from the E scale (Sigurdsson & Gudjonsson, 1996). The Addiction Scale (AS) is proposed to measure the degree to which individuals endorse addictive personality characteristics.

#### *Eysenck Personality Questionnaire*

The personality dimensions of neuroticism (N), extraversion (E) and psychoticism (P) were measured using the 106 item Eysenck Personality Questionnaire – Revised (EPQ-R; Eysenck & Eysenck, 1991). The personality traits of P, E and N are thought to have a biological basis, and to be relatively stable across the life span (Roberts & Del Vecchio, 2000). This stability allows

investigation of observable behaviour and the description of personality (Eysenck & Eysenck, 1964).

Cronbach's alpha internal consistency reliability coefficients were .68 for Psychoticism, .85 for Extraversion, .87 for Neuroticism, and .77 for the Lie (social desirability) Scale in this sample. These coefficients are similar to those noted in the manual for the EPQ-R. The reliability of the P scale has consistently been lower than that of the other scales. This is attributed to the diversity of the traits, which form the P scale. In general the EPQ-R reliability scores are considered acceptable (Eysenck & Eysenck, 1991).

## *STATISTICAL ANALYSIS*

Descriptive statistics were used to analyse the demographic data. The normality of the results for P, E, N, L, A and other continuous variables were considered by visual inspection of the box plots and histograms. Outliers were identified using descriptive statistics extreme values and boxplots. A histogram was viewed to identify extreme data points. Changing the previously identified scores to within three standard deviations of the mean reduced the impact of univariate outliers (Hair, Anderson, Tatham, & Black, 1998). With the present data this involved replacing one age case; three in the age-*tried* smoking cases, two P cases, three E cases and one of the L cases. The P, E, N and L scores were prorated when a case had less than three pieces of missing data.

Kolmogorov-Smirnov tests of normality were calculated along with analysis of skew and kurtosis. The resulting statistics led to non-parametric tests being used due to the data violating the assumptions of normality required for parametric tests, and due to the small number of participants in some of the smoking status groups.

Coefficient alpha and inter-item correlations were calculated for analysis of reliability. Spearman's rho was used to assess the strength and direction of correlations among the smoking behaviour and personality variables as well as the various measures of dependence. Kruskal-Wallis and Mann-Whitney *U* tests were used to evaluate the significance of smoking status on personality and demographic variables. The Statistical Package for Social Sciences (SPSS) for Windows versions 11.0 and 12.0 were used for all data analyses.

## Chapter 7

### RESULTS

#### Participants' Characteristics

Because the distribution was highly positively skewed ( $z$  score = 5.35,  $p > .001$ ) and data transformation was not successful in correcting the skew, age was re-coded into a dichotomous variable at the median of 21. Due to ethical committee concerns statistical calculations were not undertaken on individual ethnic groups. A dichotomous variable was generated comparing European/Pakeha to other ethnic groups. No significant differences were found between European/Pakeha and other ethnic groups on the smoking characteristics or personality dimensions using this variable

A number of calculations were used to investigate the current smoking status and related smoking characteristics of the participants in this study. No significant differences in mean rank scores were found for "age tried smoking" and "age smoked regularly" among the smoking and non-smoking categories (Table 3). The median age for first trying smoking among the 92 participants who had tried ranged from 7 to 21 years, with a median age of 14 years. The 51 participants who had continued smoking were regular smokers by the median age of 16, with a range of 12 to 30 years.

A significant difference was found when comparing overall smoking status with the number of cigarettes smoked per day,  $\chi^2(2, N = 51) = 13.83, p = .001$ . Post-hoc comparisons of the number of cigarettes smoked per day among the four smoking status groups revealed that occasional smokers' consumption was significantly less than daily smokers,  $U = 3.0, z = -3.58, p < .001$ , and former smokers,  $U = 6.0, z = -3.39, p = .001$ . For effect sizes, the  $z$ -scores show that the differences between the expected mean differences between each of the two groups' ranks and the actual mean differences were more than 3 standard deviations. The average number of cigarettes smoked per day across all smoking categories was 12 (median = 7), although the range was extreme (1-50 cigarettes per day) and positively skewed. Results showed that daily and former smokers had comparable rates of consumption,  $U = 238.0,$

$z = -0.34$ ,  $p > .05$ . There were also no significant differences between the number of quit attempts made by daily, occasional or former smokers,  $\chi^2 (2, N = 49) = 3.03$ ,  $p > .05$ ). A total of 57% of current smokers had made at least one attempt to quit smoking in the previous year.

Table 3

*Kruskal-Wallis Tests of Differences between Mean Ranks of Smoking History and Smoking Status Groups*

Variable	Non-Smoker		Occasional Smoker		Daily Smoker		Former Smoker		$\chi^2$	df
	N	Mean Rank	N	Mean Rank	N	Mean Rank	N	Mean Rank		
Age tried smoking	42	47.44	10	34.90	20	45.40	20	51.43	2.69	3
Age smoked regularly			6	26.08	23	25.02	22	27.00	0.20	2
Cigarettes per day			6	5.00 <sup>a</sup>	23	29.52 <sup>b</sup>	22	28.05 <sup>b</sup>	13.83***	2
Quit attempts in last year <sup>1</sup>			6	20.00	22	22.68	21	28.86	3.03	2

Note: <sup>1</sup> Former smokers estimated the number of quit attempts in their last year of smoking. Values with different superscripts were significantly different ( $p < .01$ ).

\*\*\* $p < .001$ , two-tailed.

No gender differences were found on the smoking variables investigating the age at which participants had tried smoking, or the age at which regular smoking was established (Table 4). There were also no gender differences found for the number of cigarettes smoked per day or the number of quit attempts made in the past year of smoking.

Table 4

*Mann-Whitney U Tests of Differences between Mean Ranks of Smoking History and Gender*

Variable	Male		Female		<i>U</i>	<i>z</i>	<i>p</i> two-tailed
	<i>N</i>	mean rank	<i>N</i>	mean rank			
Age tried smoking	27	49.61	63	43.74	739.5	- 0.98	.325
Age smoked regularly	10	32.60	41	24.39	139.0	- 1.58	.114
Cigarettes per day	10	25.40	41	26.15	199.0	- 0.14	.886
Quit attempts in last year <sup>1</sup>	9	27.28	40	24.49	159.5	- 0.55	.602

<sup>1</sup> Occasional smoker – smokes cigarettes less than daily

A 2\*2 chi-square test for independence was used to investigate the relationship between gender and the four smoking status categories. Due to the results being invalidated by an expected cell count of less than five the smoking status variables were recoded into current smokers (daily and occasional smokers) and current non-smokers (former and non-smokers). No significant differences were found between gender and the two smoking status categories  $\chi^2 (1, N = 97) = 2.28, p = 0.13$ , using Yates' Correction. However it should be noted that of the ten participants who indicated they were occasional smokers, 100% were female. Participants who considered themselves to be on a low income as opposed to a middle-high income were compared on a number of different variables (Table 5).

Table 5

*Mann-Whitney U Tests of Differences between Mean Ranks of Smoking, Personality and Nicotine Dependence by Income*

Variable	Low Income		Middle-High <u>Income</u>		<i>U</i>	<i>z</i>	<i>p</i> two-tailed
	<i>N</i>	mean rank	<i>N</i>	mean rank			
Age tried smoking	60	43.94	31	49.98	806.5	- 1.04	.298
Age smoked regularly	32	24.13	19	29.16	244.0	-1.18	.238
Cigarettes per day	32	26.97	19	24.37	273.0	- 0.14	.544
Quit attempts in last year <sup>1</sup>	31	26.79	18	21.92	223.5	- 0.55	.235
Psychoticism	73	58.59	36	47.72	1052.0	-1.70	.090
Extraversion	74	54.86	33	52.06	1157.5	-0.43	.668
Neuroticism	74	57.19	38	55.16	1355.0	-0.31	.754
Lie Scale	73	53.58	37	59.28	1210.5	-0.89	.374
Addiction Scale	75	60.49	40	53.34	1313.5	-1.10	.272
HSI	32	25.39	19	27.03	284.5	-0.40	.687
DSM-IV Withdrawal	32	28.91	19	21.11	211.0	-1.84	.065

No significant differences were found on the smoking status, smoking characteristics, personality dimensions or nicotine dependence measures when compared to income ( $p > .05$ ). As previously mentioned the various factors were not compared on ethnicity.

#### *Differentiating Smokers and Non-smokers on the Addiction Scale*

The first goal was to investigate the utility of the Eysenck Addiction Scale in differentiating smokers from non-smokers. Kruskal-Wallis tests of difference were used to establish whether smoking status significantly impacted on Addiction Scale scores (Table 6).

Table 6

*Kruskal-Wallis Tests of Differences between Mean Ranks of Personality Trait Scores, the Heaviness of Smoking Index, and DSM-IV Withdrawal Symptoms for Smoking Status Groups*

Variable	Non-Smoker		Occasional Smoker		Daily Smoker		Former Smoker		$\chi^2$	df	
	N	mean rank	N	mean rank	N	mean rank	N	mean rank			
Psychoticism	61	51.39 <sup>a</sup>	7	38.21 <sup>a</sup>	22	77.70 <sup>b</sup>	21	52.60 <sup>ac</sup>	13.77**	3	
Extraversion	60	50.15 <sup>a</sup>	10	63.15	19	76.37 <sup>b</sup>	20	45.17 <sup>ac</sup>	12.76**	3	
Neuroticism	62	52.10	8	58.13	22	61.18	22	68.80	4.51	3	
Lie	60	60.23	8	45.13	22	45.98	22	61.00	4.53	3	
Addiction	64	49.49 <sup>a</sup>	8	68.13 <sup>ab</sup>	23	68.6 <sup>b</sup>	7	22	73.23 <sup>b</sup>	11.41**	3
HSI			6	12.50 <sup>a</sup>	23	27.43 <sup>b</sup>	22	28.18 <sup>b</sup>	6.35*	2	
DSM-IV			6	17.00	23	28.87	22	25.45	3.19	2	

Note. Values with different superscripts were significantly different ( $p < .01$ ).

\* $p < .05$ ; \*\* $p < .01$ , two-tailed.

There were significant differences among the smoking categories on the Addiction Scale  $\chi^2 (3, N = 117) = 11.41, p = .01$ . Differences were found when comparing non-smokers and other categories. Mann-Whitney  $U$  non-parametric tests were used to establish significant differences on the Addiction Trait between non-smokers and daily smokers  $U = 481.50, z = -2.46, p = .01$  and non-smokers and former smokers  $U = 433, z = -2.69, p = .007$ . However there was no significant difference between non-smokers and occasional smokers on the Addiction Scale,  $U = 173, z = -1.49, p > .05$ . Gender differences were found with women scoring significantly higher than men on the Addiction Scale,  $U = 1013, z = -2.58, p = .01$ .

#### *Personality Traits and Smoking Status*

A further goal was to identify the personality factors that distinguish smokers from non-smokers (Table 6). Mann-Whitney  $U$  non-parametric tests were used to establish significant differences. The results of the Eysenck Personality Questionnaire-Revised showed that daily smokers scored higher than non-smokers on the personality dimensions of P and E as well as the AS; however only two of the differences were significant. Daily smokers scored significantly higher than non-smokers on both Psychoticism,  $U = 361.0, z = -3.21, p = .001$  and Extraversion,  $U = 302.5, z = -3.08, p = .002$ . There were no significant differences between the smokers and non-smokers on Neuroticism or the social desirability (L) scale. There were no significant gender differences among the personality variables of Psychoticism and Extraversion. Women, however, scored significantly higher than men on Neuroticism,  $U = 718.5, z = -4.14, p = .001$ .

#### *Concordance of Measures*

A further objective was to examine the concordance between the various measures of nicotine dependence (Table 7). In this study there were no significant correlations between any of the dependence measures. The Heaviness of Smoking Index and the number of cigarettes per day were highly

correlated as would be expected due to the inclusion of the same question in both measures ( $r = .82, p < .001$ ).

Table 7

*Correlations between Dependence Measures and Smoking Variables using Spearman's rho*

	1	2	3	4	5
1. Cigarettes per day		-.01	.14	.82**	.17
2. Quit Attempts			-.25	-.15	.19
3. Addiction Scale				.07	-.13
4. Heaviness of Smoking Index					.13
5. DSM-IV withdrawal symptoms					

\*\* $p \leq .01$  level (2-tailed).

#### *Self-Perceived Dependence Compared to Dependence Measures*

The final goal was to compare self-perceived nicotine dependence to established measures of dependence. A chi-square test of difference found that 62% of current smokers and 64% of former smokers perceived themselves as nicotine dependence. Further similarities included the ages at which the smoking groups had initiated and become regular smokers (Table 8). The two groups also had similar P and E scores on the EPQ-R although significant differences were found on Neuroticism,  $U = 164.5, z = -2.14, p = .032$  with those who indicated that they were nicotine dependent having lower Neuroticism scores.

Table 8

*Mann-Whitney U Tests of Differences between Mean Ranks of Smoking Characteristics, Personality and Self-Perceived Dependence among Daily, Occasional and Former Smokers*

Variable	Self-Perceived Nicotine Dependence				<i>U</i>	<i>z</i>	<i>p</i>
	Yes		No				
	<i>N</i>	mean rank	<i>N</i>	mean rank			
Age tried smoking	26	22.19	19	24.11	226.0	- 0.49	.626
Age smoked regularly	32	23.72	19	29.84	231.0	- 1.44	.151
Psychoticism	29	25.50	17	20.09	188.5	- 0.18	.184
Extraversion	28	24.45	16	19.09	169.5	- 1.34	.181
Neuroticism	31	21.31	17	30.32	164.5	- 2.14	.032
Lie Scale	32	24.20	17	26.50	246.5	- 0.54	.590

When considering the various measures of dependence, significant differences were found on the number of cigarettes smoked per day  $U = 173.0$ ,  $z = -2.57$ ,  $p = .01$  and the Addiction Scale,  $U = 150.0$ ,  $z = -2.57$ ,  $p = .01$  (Table 9). Participants who indicated that they considered themselves nicotine dependent indicated that they had smoked more cigarettes per day yet scored comparatively lower on the addiction trait. There were no significant differences on the Heaviness of Smoking Index, the DSM-IV withdrawal symptoms or the number of quit attempts in the previous year.

Table 9

*Mann-Whitney U Tests of Differences between Mean Ranks of Self-Perceived Dependence among Smokers and Nicotine Dependence Measures*

Variable	Self-Perceived Nicotine Dependence				<i>U</i>	<i>z</i>	<i>p</i> two-tailed
	Yes		No				
	<i>N</i>	mean rank	<i>N</i>	mean rank			
Cigarettes per day	32	30.09	19	19.11	173.0	- 2.57	.010
Quit attempts in last year <sup>1</sup>	31	26.29	18	22.78	239.0	- 0.86	.392
Addiction Scale	32	21.19	17	32.18	150.0	- 2.57	.010
HSI	32	28.64	19	21.55	219.5	- 1.75	.081
DSM-IV Withdrawal	32	28.25	19	22.21	232.0	- 1.43	.154

## Chapter 8

### DISCUSSION

This study had a number of goals: (1) to investigate the utility of the Eysenck Addiction Scale in differentiating smokers from non-smokers, (2) to identify the personality factors that distinguish smokers from non-smokers, (3) to examine the concordance between different measures of nicotine dependence and (4) to compare self-perceived nicotine dependence to established measures of nicotine dependence.

#### *Participant Characteristics*

Initiation of smoking was expected to have occurred at the age of 12-13 years (Health Sponsorship Council, 2000) with regular smoking established by 14-16 years (Fergusson & Horwood, 1995). In this sample the participants indicated that they had started smoking at age 14, with regular smoking established by the age of 16 years. This is older than the results found in the general population. One possible reason for this finding is suggested by the research that found that university students may initiate smoking when they come to university (Ontario University, 2005) which would result in a comparatively late age of initiation.

A review of the literature indicated that in a New Zealand population the majority of current smokers were likely to be consuming on average 12 cigarettes per day (Ministry of Health, 2003). This is the same rate of consumption that was found in the present study although the range of consumption was positively skewed. Ministry of Health (2001b) research indicates that 25% of individuals over the age of 15 are current smokers. Among the current sample 20% indicated that they were daily smokers and a further 8.3% considered themselves to be occasional smokers. When these figures are combined the percentage of individuals who identify as current smokers was 28.3% within this sample. The smoking prevalence is similar to

that found for the general population and is likely to be slightly higher due to the specific inclusion of individuals who do not smoke daily.

The major characteristic that differentiated this sample from previous research was the finding that 100% of the occasional smokers were female. Shiffman, Kassel et al. (1994) did not find gender differences among occasional smokers. A study undertaken by Kypri and Baxter (2004) among a New Zealand University sample of students found that 10% of women and 9% of men reported occasional smoking, although the rates for daily smoking were extremely low (10% for both males and females). It was suggested that the low smoking prevalence was due to ethnic differences, specifically higher percentages of students who identified as European and lower percentages of Maori, Pacific Island and Asian students. It is unclear why the current study found such a disparity in the gender of occasional smokers. However it is hypothesised that a larger sample of male participants may have provided different results, particularly as the overall number of cigarettes per day smoked by daily smokers did not reflect gender differences.

Despite the significantly lower rate of consumption found among occasional smokers it appears that all of the smoking groups found quitting equally difficult, with no apparent relationship between consumption and the difficulties experienced when trying to quit. This finding appears to suggest that physiological factors play less of a role in the maintenance of smoking than social, behavioural or psychological factors as the rate of consumption found among occasional smokers is insufficient to maintain physiological dependence. Smoking five or less cigarettes per day is unlikely to maintain significant blood levels of nicotine (Shiffman, Kassel, et al., 1994). A total of 57% of current smokers had made at least one attempt to quit smoking in the previous year, which is comparable to the 60% found by Ministry of Health researchers in 2003.

#### *Utility of the Eysenck Addiction Scale*

While the Addiction Scale has been used in previous research involving a range of addictions no studies were found in which the Addiction Scale had

been used to investigate the relationship between smokers and non-smokers. It was hypothesised that smokers would score higher on the Addiction Scale than non-smokers. The finding that daily smokers score significantly higher on the EPQ-R Addiction Scale than non-smokers does not appear to have previously been reported. The Addiction Scale on the EPQ-R is a tool, which appears to be somewhat under utilised as a measure of addiction. A number of recent studies into nicotine dependence and smoking behaviour have measured P, E, N and L, but have not included the Addiction Scale (Arai et al., 1997; Canals et al., 1997; Joseph et al., 2003; Kawakami et al., 2000; Papakyriazi & Joseph, 1998) although the Addiction Scale has been available since 1991. A number of studies investigating personality dimensions using the EPQ-R, in association with addictive behaviours, have also disregarded the Addiction Scale. To date they have included smoking motivation (Joseph et al., 2003), alcohol and drug use (Sigurdsson & Gudjonsson, 1996), personality and hallucinogens (Nishith et al., 1994), smokeless tobacco (Spielberger et al., 2004) and smokers and ex-smokers (Patton et al., 1993). When the EPQ-R is administered in research focusing on addiction, it is recommended that the additional calculation of the Addiction Scale be made. The Addiction Scale does not require additional administration time as the questions are derived from the three main personality scales. Consequently the only requirement to gain this additional information is a minor statistical calculation. The range of addictive behaviours which have now shown to provide significant findings when assessed on the scale provide a reasonable base for recommending its use.

#### *Personality Traits and Smoking Status*

A second goal was to identify the relationship between extraversion, neuroticism and psychoticism as measured by the EPQ-R, and smoking status. On the basis of previous research findings it was expected that smokers would score higher on all three personality scales of the EPQ-R. The results indicated marked personality differences between smokers and non-smokers. In the present study smokers scored significantly higher than non-smokers on the Extraversion and Psychoticism dimensions as has previously been found (Joseph et al., 2003; Lopez et al., 2001). Smokers also scored higher than non-

smokers on the Neuroticism scale; however, this finding was not significant. Neither of these findings is different from reviews of the relationship between the personality dimensions and smoking variables. As previously noted, Gilbert (1995, cited in Shadel, Niaura, et al., 2000) and more recently Joseph et al. (2003) summarised a number of studies which concluded that smokers' generally have higher P, E and N scores than non-smokers.

Eysenck suggested that smokers' who score higher on E, smoke to reduce boredom. The typical extravert is described as sociable, impulsive, may easily lose their temper and be unreliable as opposed to the introverts who are quiet, retiring and introspective (Eysenck & Eysenck, 1969). Smokers who score highly on the N scale smoke to reduce stress. Individuals who score highly on the N scale are said to be anxious, worrying, moody and emotional. It is hypothesised that they react too strongly to all sorts of stimuli and find it difficult to return to a state of emotional equilibrium. In contrast, those who score low on the N scale are described as calm and even tempered. When emotionally aroused these individuals return to a state of equilibrium much faster than their high scoring counterparts (Eysenck & Eysenck, 1991).

The relationship between the personality trait of P and smoking has a more social basis. Individuals who score highly on the trait of Psychoticism are hypothesised to smoke in order to achieve the negative stereotype associated with smoking (Patton et al., 1993; Spielberger et al., 2004). They are purported also to disregard danger, lack empathy and be insensitive (Eysenck & Eysenck, 1991).

No single factor has been found to predict smoking status. Most individuals who try their first cigarette find the experience unpleasant but are experimenting out of curiosity (Stanton et al., 1989) or as an act of rebellion (Jarvis, 2004). Approximately 80% of New Zealand children under the age of 15 have tried smoking. However a much smaller percentage continue to smoke. Personality traits are considered stable in most individuals. If particular types of personality traits increase the likelihood of the initiation and maintenance of smoking, then these characteristics can be examined with a view to targeting appropriate interventions at the earliest possible time. The

cost of smoking is devastatingly high both in health and financial terms. Any reduction in this addictive behaviour is likely to have wide-spread benefits.

### *Concordance of Dependence Measures*

The relationship between various smoking measures was expected to be minimal. Hughes et al. (2004) previously found poor correlations between generic measures such as the DSM-IV and the Faegerstron Test of Nicotine Dependence, which is the predecessor of the Heaviness of Smoking Index (HSI), self rating of the difficulties experienced when trying to quit smoking and self rating of addiction and consumption measures (cigarettes per day).

Accurate assessment of dependence is an important step in any treatment plan. The presence of cigarette smoking is not a necessary predictor of the presence of addiction; although it is considered a good indicator that further evaluation is necessary (Dodgen, 2005). The difficulty in assessing this information lies in the individual nature of the currently available measures. Commonly the diagnosis of nicotine dependence is made using criteria such as that provided by the DSM-IV-TR. The assessment of the presence of nicotine withdrawal using DSM criteria assumes the presence of physical dependence and provides a categorical diagnosis. Alternatively, the HSI as a self-report measure of the degree of dependence based on consumption and craving provides an assessment of dependence as a continuous variable. In contrast the Addiction Scale provides an assessment of dependence based on personality traits. The lack of concordance found among the measures assessed in this study appears to be a result of the multifactorial nature of nicotine dependence.

Diaz et al. (2005) noted that historically nicotine dependence was assumed when individuals indicated that they smoked over 30 cigarettes per day. This measure of consumption would assess the majority of cigarette smokers in New Zealand as being non-nicotine dependent given that the average cigarette consumption is around 12 cigarettes per day (Ministry of Health, 2003). The degree to which an individual is considered dependent has often been considered a factor of consumption. Research into the physiological impact of nicotine consumption shows that the rate of consumption among

many daily smokers would have toxic effects on non-smokers. However consumption does not provide a linear correlation with dependence.

### *Self Perceived Dependence Compared to Measures of Dependence*

Self-perceived nicotine dependence is infrequently investigated and the proposed outcomes of this relationship were unclear. According to Doweiko, (2002), 90-95% of people who smoke are nicotine dependent as indicated by the presence of "tolerance, withdrawal and drug seeking behaviour" (p.235). Only 62% of current smokers and 64% of former smokers in this study indicated that they considered themselves nicotine dependent. Chippers or occasional smokers who constitute 5-10% of smokers generally do not consider themselves nicotine dependent (Shiffman, Patty, et al., 1994). Of this sample 10% of chippers considered themselves nicotine dependent although their rate of consumption was not considered high enough to constitute physical dependence to nicotine and the sample was very small. Furthermore there were no significant differences between occasional, daily and former smokers on the number of quit attempts that they had made in the previous year. Research to date has not identified the biological or personality characteristics that distinguish chippers from regular smokers who become dependent (Doweiko, 2002). Individuals who considered themselves nicotine dependent had smoked significantly more cigarettes per day than their counterparts. This perhaps suggests a degree of insight into their degree of dependence and is likely to correlate with measures of consumption.

### *PREVENTION PREFERABLE TO TREATMENT*

The Diagnostic and Statistical Manual of the American Psychological Association - Text Revision (2000) states that among regular smokers it is estimated that 80-90% are nicotine dependent. While this would appear to be a simple statement it assumes that there is a single definition for a regular smoker and nicotine dependence. A review of the literature reveals that this is not so. Smoking research suffers from a lack of consistency in defining concepts and variables. Not only is there variation in the definition of "smoker" but also in the definition of "dependence". It would appear that a continuum of smoking

behaviour as well as dependence is necessary to incorporate all of the idiosyncrasies of the current state of cigarette smoking.

Dependence may involve social, behavioural, cultural and emotional factors. Smokers who smoke less than daily may still identify themselves as dependent, irrespective of their low biochemical levels. Occasional smokers have many similar features to non-smokers. Former and current smokers have similar addiction trait scores suggesting a degree of similarity in their personality makeup. Further investigation is needed to elicit the factors that enabled former smokers to quit.

Current understanding of cigarette smoking does not stop people from starting smoking or help them give up when they have started. Quit rates remain low for assisted programmes and individual attempts. Overall the lack of success in the smoking cessation field supports the need for further research initiatives. While there is nothing to be gained from disputing the relationship between smoking and negative health outcomes there may be some merit to further exploration of alternative indicators of causation.

### *LIMITATIONS*

The limitations of this study include the small size of the sample in terms of the smoking population and the small percentage of male participants. A further limitation was the unrepresentative nature of the age range. This was a predominantly young sample and long-term smokers are likely to be older and provide different findings. The participants of this research are not representative of any population other than first year psychology university students and as such the results cannot be generalised to a wider population.

A further important limitation was the lack of investigation into the variation among ethnic groups due to ethical concerns. The literature in the field identifies a number of significant differences both among various ethnic groups and also between the genders within individual groups. It is recommended that further research consider the implications of ethnic differences and pursue a large enough sample in order to provide useful data to support intervention and treatment plans. This would have to be explored within ethical guidelines and in the context of appropriate consultation with the

relevant groups. The smoking prevalence rates within New Zealand indicate that certain ethnic groups are much more at risk of the negative impacts of smoking and therefore have a lot more to lose.

#### *FUTURE RECOMMENDATIONS*

The main recommendation following the completion of this study is the suggestion to calculate the Addiction Scale scores when administering the EPQ-R to any populations in which addictive behaviours are being investigated. The results of this study and previous research has found that the Addiction Scale is able to measure an individuals level of addiction on a continuum of addiction across a number of contexts.

It is further recommended that researchers as well as service providers recognise the lack of cohesion and agreement within the field in regards to the defining, measuring and diagnosing of nicotine dependence. Until this dilemma has been addressed it is unlikely that the true costs of cigarette smoking and the effectiveness of cessation treatment can be assessed, particularly when comparing results using meta-analytic techniques.

Had this study included a larger sample and if the distributions had allowed the use of parametric tests a hierarchical regression analysis would have provided the opportunity to investigate the contribution of the various predictor variables to smoking status. In particular it would have been useful to investigate the degree to which personality traits and in particular, the addiction trait impact on smoking behaviour. A further study could investigate the variables, which distinguish current and former smokers in order to identify the particular factors that may have enhanced the former smokers ability to quit smoking. With a younger participant group the factors which predict continuation of smoking could also be investigated with a view to providing targeted interventions or increasing awareness of risk factors which enhance the likelihood of smoking experimentation becoming an established behaviour.

#### *IMPLICATIONS*

This study has provided further evidence that the Eysenck Addiction Scale can effectively distinguish the personality traits related to addiction in relation to a wide range of addictive behaviours. Research has already

established the presence of correlations between drugs, alcohol and the presence of mental health problems. With evidence that the AS can establish nicotine dependence as an indicator of the presence of the addiction trait it is suggested that the presence of cigarette smoking be considered a reminder to further investigate both the presence of additional substance abuse and to consider an increased likelihood of a predisposition to mental illness. Nicotine dependence is reasonably well identified using the two questions of the HSI. This quick and easy assessment enables practitioners to assess dependence as well as providing the opportunity to initiate a conversation about substance use using a relatively innocuous and legally acceptable substance.

The research outlines the finding that the initiation of smoking is socially driven. This study found that age of initiation is not a factor in the transition from experimentation to regular smoking. It also established that once an individual becomes a regular smoker the number of withdrawal symptoms they experience and the number of quit attempts they make are fairly similar irrespective of the number of cigarettes per day that they smoke. Quitting smoking is equally difficult for occasional and daily smokers. The focus of smoking intervention needs to be on stopping the transition from experimentation to regular smoking. Therefore the emphasis needs to be on early intervention. The recognition that prevention and intervention need to focus on social pressure may help to protect our young people from starting smoking and can save lives.

## *CONCLUSIONS*

In summary the main conclusion of this study is that the Addiction Scale of the EPQ-R is a useful measure of the addiction trait among cigarette smokers and can provide additional information without adding a significant amount of time to the administration of the questionnaire or in terms of statistical calculations. A further conclusion was that the current measures used to assess nicotine dependence show little concordance and questions their use as valid research and treatment tools. Finally it was concluded that requesting smokers to indicate their perception of whether they are nicotine dependent or not could provide useful information when considering their current smoking

status . Overall the research into cigarette smoking appeared to lack consistency which leads to questioning of both its reliability and validity.

## REFERENCES

- Aluja, A., Garcia, O., & Garcia, L. F. (2004). Replicability of the three, four and five Zuckerman's personality super-factors; exploratory and confirmatory factor analysis of the EPQ-RS, ZKPQ and NEO-PI-R. [Electronic Version]. *Personality and Individual Differences*, 36, 1093-1108.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (text revision). Washington, DC: Author.
- Arai, Y., Hosokawa, T., Fukao, A., Izumi, Y., & Hisamichi, S. (1997). Smoking behaviour and personality: A population-based study in Japan. [Electronic Version]. *Addiction*, 92(8), 1023-1033.
- Asthma and Respiratory Foundation of New Zealand. (2005). *Aotearoa New Zealand Smokefree workplace: A 12 month report*. Wellington: Asthma and Respiratory Foundation of New Zealand.
- Atrens, D. M. (2001). Nicotine as an addictive substance: A critical examination of the basic concepts and empirical evidence. [Electronic Version]. *Journal of Drug Issues*, 31(2), 325-394.
- Ayanian, J. Z. (1999). Perceived risks of heart disease and cancer among cigarette smokers. [Electronic Version]. *Journal of the American Medical Association*, 281(11), 1019-1026.
- Batra, A. (2004). Genetics of nicotine dependency. *Practising Medicine*. 1-6.
- Benowitz, N. L. (2001). The nature of nicotine addiction. In P. Slovic, (Ed.), *Smoking: Risk, perception and policy* (pp. 159-187). USA: Sage Publications.
- Benowitz, N. L., & Henningfield, J. E. (1994). Establishing a nicotine threshold for addiction – The implications for tobacco regulation. [Electronic Version]. *The New England Journal of Medicine*, 33(3), 123-125.
- Benowitz, N. L., Pomerleau, O. F., Pomerleau, C. S. & Jacob III, P. (2003). Nicotine metabolite ratio as a predictor of cigarette consumption. [Electronic Version]. *Nicotine & Tobacco Research*, 5(5), 621-624.
- Berger, G. (1982). *Addiction, its causes, problems and treatments*. New York: Franklin Watts.
- Best, D., Rawaf, S., Rowley, J., Floyd, K., Manning, & Strang, J. (2000). Drinking and smoking as concurrent predictors of illicit drug use and positive drug attitudes in adolescents. [Electronic Version]. *Drug and Alcohol Dependence*, 60, 319-321.
- Błaszczynski, A. P., Buhrich, N., & McConaghy, N. (1985). Pathological gamblers, heroin addicts and controls compared on the E.P.Q. 'Addiction Scale'. [Electronic Version]. *British Journal of Addiction*, 80, 315-319.
- Brauer, L. H., Hatsukami, D., Hanson, K., & Shiffman, S. (1996). Smoking topography in tobacco chippers and dependent smokers. [Electronic Version]. *Addictive Behaviors*, 21(2), 233-238.
- Breslau, N., Johnson, E. O., Hiripi, E., & Kessler, R. (2001). Nicotine dependence in the United States. [Electronic Version]. *Archives of General Psychiatry*, 58(9), 810-821.
- Breslau, N., Kilbey, M. M., & Andreski, P. (1994). DSM-III-R nicotine dependence in young adults: Prevalence, correlates and associated psychiatric disorders. [Electronic Version]. *Addiction*, 89, 743-754.

- Breteler, M. H. M., Hilberinck, S. R., Zeeman, G., & Lammers, S. M. M. (2004). Compulsive smoking: The development of a Rasch homogeneous scale of nicotine dependence. [Short communication]. [Electronic Version]. *Addictive Behaviors*, 29(1), 199-205.
- Burling, A. S. & Burling, T. A. (2003). A comparison of self-report measures of nicotine dependence among male drug/alcohol-dependent cigarette smokers. *Nicotine & Tobacco Research*, 5(5), 625-633.
- Byrne, D. G., Byrne, A. E., & Reinhart, M. I. (1995). Personality, stress and the decision to commence cigarette smoking in adolescence. [Electronic Version]. *Journal of Psychosomatic Research*, 39, 1.
- Canals, J., Blade, J., & Domenech, E. (1997). Smoking and personality predictors in young Spanish people. [Electronic Version]. *Personality and Individual Differences*, 23, 905-908.
- Cancer Society of New Zealand. (2001a) Health effects of smoking. Retrieved February 16, 2003, from [www.cancernz.org.nz/INFO/PDF](http://www.cancernz.org.nz/INFO/PDF).
- Cancer Society of New Zealand. (2001b) Smokefree environments act 1990: Part 1. Retrieved February 16, 2003, from [www.cancernz.org.nz/INFO/PDF](http://www.cancernz.org.nz/INFO/PDF).
- Cancer Society of New Zealand. (2001c) Smoking and Maori. Retrieved February 16, 2003, from [www.cancernz.org.nz/INFO/PDF](http://www.cancernz.org.nz/INFO/PDF).
- Cancer Society of New Zealand. (1996). *The big kill continues: The human cost of smoking in New Zealand in the 1990's*. New Zealand: Cancer Society of New Zealand.
- Cataldo, J. K. (2001). The role of advanced practice psychiatric nurses in treating tobacco use and dependence. [Electronic Version]. *Archives of Psychiatric Nursing*, XV(3), 107-119.
- Colby, S. M., Tiffany, S. T., Shiffman, S., & Niaura, R. S. (2000a). Are adolescent smokers dependent on nicotine? A review of the evidence. [Review] [Electronic Version]. *Drug and Alcohol Dependence*, 59(Suppl. 1), S83-S95.
- Colby, S. M., Tiffany, S. T., Shiffman, S., & Niaura, R. S. (2000b). Measuring nicotine dependence among youth: A review of available approaches and instruments. [Electronic Version]. *Drug and Alcohol Dependence*, 59(Suppl. 1), S23-S39.
- Coleman, T. (2004). Cessation interventions in routine health care. In J. Britton (Ed.), *ABC of Smoking Cessation* (pp.18-21). USA: Blackwell Publishing.
- Coolican, H. (1999). *Research methods and statistics in psychology* (3rd ed.). London: Hodder and Stoughton.
- Corrigall, W. A., Zack, M., Eissenberg, T., Belsito, L., & Scher, R. (2001). Acute subjective and physiological responses to smoking in adolescents. [Electronic Version]. *Addiction*, 96, 1409-1417.
- Cramer, D. (2003). *Advanced quantitative data analysis*. Philadelphia: Open University Press.
- Cromwell, J., Bartosch, W. J., Fiore, M. C., Hasselblad, V., & Baker, T. (1997). Cost-effectiveness of the clinical practice recommendations in the Agency for Health Care Policy Research (AHCPR) guideline for smoking cessation. [Electronic Version]. *The Journal of the American Medical Association*, 278(21), 1759-1767.
- Cuijpers, P., & Smit, F. (2002). Nicotine dependence and regular nicotine use in adult children of alcoholics. [Electronic Version]. *Addiction Research and Theory*, 10(1). 69-81.

- Dar, R. & Frenk, H. (2002). Nicotine addiction: Fact or theory? [Electronic Version]. *Addiction Research and Theory*, 10(3), 219-224.
- Davis, C., & Claridge, G. (1998). The eating disorders as addiction: A psychobiological perspective. [Electronic Version]. *Addictive Behaviors*, 23(4), 463-475.
- de Beyer, J., Lovelace, C., & Yurekli, A. (2001). Poverty and tobacco, *Tobacco Control*, 10(3), 210-213.
- de Leon, J., Diaz, F. J., Becona, E., Gurpegui, M., Jurado, D., & Gonzalez-Pinto, A. (2002). Exploring brief measures of nicotine dependence for epidemiological surveys. [Electronic Version]. *Addictive Behaviors*, 889, 1-6.
- de Silva, P., & Eysenck, S. (1987). Personality and addictiveness in anorexic and bulimic patients. [Electronic Version]. *Personality and Individual Differences*, 8(5), 749-751.
- Degenhardt, L., Hall, W., & Lynskey, M. (2001). Alcohol, cannabis and tobacco use among Australians: A comparison of their associations with other drug use and use disorders, affective and anxiety disorders, and psychosis. [Electronic Version]. *Addiction*, 96, 1603-1614.
- Diaz, F. J., Jane, M., Salto, E., Pardell, H., Salleras, L., Pinet, C., & de Leon, J. (2005). A brief measure of high nicotine dependence for busy clinicians and large epidemiological surveys. *Australian and New Zealand Journal of Psychiatry*, 39, 161-168.
- Dijkstra, A., & Tromp, D. (2002). Is the FTND a measure of psychical as well as psychological tobacco dependence? [Electronic Version]. *Journal of Substance Abuse Treatment*, 23, 367-374.
- DiFranza, J. R. (2000). Youth access: The baby and the bath water. [Editorial]. [Electronic Version]. *Tobacco Control*, 9, 120-121.
- DiFranza, J. R., Rigotti, N. A., McNeill, A. D., Ockene, J. K., Savageau, J. A., St Cyr, D., et al. (2000). Initial symptoms of nicotine dependence in adolescents. [Electronic Version]. *Tobacco Control*, 9, 313-319.
- DiFranza, J. R., Savageau, J. A., Rigotti, N. A., Fletcher, K., Ockene, J. K., McNeill, A. D., et al. (2002). Development of symptoms of tobacco dependence in youths: 30 month follow-up data from the DANDY study. [Electronic Version]. *Tobacco Control*, 11(3), 228-236.
- Dodgen, C. E. (2005). *Nicotine Dependence: Understanding and applying the most effective treatment interventions*. Washington: American Psychological Association.
- Doweiko, H. E. (2002). *Concepts of chemical dependency*. (5th ed.). Australia: Brooks Cole.
- Edwards, P. R., van Tongeren, M., Watson, A., Gee, I., & Edwards, R. E. (2004). Environmental tobacco smoke, *Occupational and Environmental Medicine*, 61, 385-386.
- Eaves, L. J., Eysenck, H. J., & Martin, N. G. (1989). *Genes, culture and personality. An empirical approach*. London: Academic Press.
- Ellickson, P. L., McGuigan, K. A., & Klein, D. J. (2001). Predictors of late-onset smoking and cessation over 10 years. [Electronic Version]. *Journal of Adolescent Health*, 29, 101-108.
- Etter, J. F. (2005). A comparison of the content -, construct - and predictive validity of the Cigarette Dependence Scale and the Fagerstrom Test for Nicotine Dependence, *Drug and Alcohol Dependence*, 77, 259-268.

- Etter, J. F., Vu Duc, T., & Perneger, T. V. (1999). Validity of the Fagerstrom Test for Nicotine Dependence and of the Heaviness of Smoking Index among relatively light smokers. [Electronic Version]. *Addiction*, 94(2), 269-282.
- Everett, S. A., Warren, C. W., Sharp, D., Kann, L., Husten, C. G., & Crossett, L. S. (1999). Initiation of cigarette smoking and subsequent smoking behavior among U.S. high school students. [Electronic Version]. *Preventive Medicine*, 29, 327-333.
- Eysenck, H. J. (1955). *Dimensions of Personality*. London: Lund Humphries.
- Eysenck, H. J. (1967). *The biological basis of personality*. USA: Charles C Thomas.
- Eysenck, H. J. (1990). *Rebel with a cause*. London: W. H. Allen and Co.
- Eysenck, H. J., & Eysenck, S. B. G. (1964) *Manual of the Eysenck Personality Inventory*. London: University of London Press.
- Eysenck, H. J., & Eysenck, S. B. G. (1969). *Personality structure and measurement*. London: Routledge & Kegan Paul.
- Eysenck, H. J., & Eysenck, S. B. G. (1991). *Manual of the Eysenck Personality Scales (EPS Adult)*. London: Hodder & Stoughton.
- Fagerstrom, K. O. (1978). Measuring degree of physical dependence to tobacco smoking with reference to individualisation of treatment, *Addictive Behaviours*, 3, 235-241.
- Fergusson, D. M., Goodwin, R. D., & Horwood, L. J. (2003). Major depression and cigarette smoking; Results of a 21-year longitudinal study. [Electronic Version]. *Psychological Medicine*, 33, 1357-1367.
- Fergusson, D. M., & Horwood, L. J. (1995). Transitions to cigarette smoking during adolescence. [Electronic Version]. *Addictive Behaviors*, 20(5), 627-642.
- Ferguson, S. G., & Miller, O. T. (2001). Environmental influences on craving and the physiological and cognitive effects on cigarette smoking. *New Zealand Journal of Psychology*. 30(2), 44-51.
- Ferrando, P. J. (2003). The accuracy of the E, N and P trait estimates: An empirical study using the EPQ-R. [Electronic Version]. *Personality and Individual Differences*, 34, 665-679.
- Gibson, H. B. (1981). *Hans Eysenck: The man and his work*. London: Peter Owen.
- Gilbert, D. G. (1980). Introversion and self-reported reason for and time of urge for smoking. *Addictive Behaviors*, 5, 97-99.
- Glassman, A. H. (1993). Cigarette smoking: Implications for psychiatric illness, *American Journal of Psychiatry*, 150, 546-553.
- Goodman, A. (1990). Addiction: Definition and implications. [Electronic Version]. *British Journal of Addiction*, 85, 1403-1408.
- Hair, J. F. Jr., Anderson, R. E., Tatham, R. L., Black, W. C. (1998). *Multivariate data analysis*. New Jersey: Prentice Hall.
- Hall, W., Madden, P., & Lynskey, M. (2002). The genetics of tobacco use: Methods, findings and policy implications. [Electronic Version]. *Tobacco Control*, 11(2), 119-115.

- Hall, C. S., Lindzey, G., Loehlin, J. C., Manosevitz, M., & Locke, V. O. (1985). *Introduction to theories of personality*. New York: John Wiley & Sons.
- Health Canada. (2003). Youth smoking in Canada. Retrieved February 12, 2003, from [www.hc-sc.gc.ca/necs-sesc/tobacco/index.html](http://www.hc-sc.gc.ca/necs-sesc/tobacco/index.html)
- Health Funding Authority. (1999). *Toward a tobacco-free New Zealand: A five-year plan for HFA funding for tobacco control (1999-2003)*. Wellington: Health Funding Authority.
- Health Sponsorship council (2000). *Tobacco Facts 2000: Cigarette smoking prevalence trends*. Retrieved October 9, 2003, from <http://www.moh.govt.nz/moh.nsf/238fd5fb4fd051844c256669006aed57/b4d65e53abb93291cc25708a007d1388?OpenDocument>
- Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerstrom, K. O. (1991). The Fagerstrom Test for Nicotine Dependence: A revision of the Fagerstrom Tolerance Questionnaire. [Electronic Version]. *British Journal of Addiction*, 86, 1119-1127.
- Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., Rickert, W., & Robinson, J. (1989). Measuring the Heaviness of Smoking: Using self-reported time to the first cigarette of the day and number of cigarettes smoked per day. [Electronic Version]. *British Journal of Addiction*, 84, 791-800.
- Henningfield, J. E. (1985). *The encyclopaedia of psychoactive drugs: Nicotine an old fashioned addiction*. Netherlands: Burke Publishing.
- Hughes, J. R. (2001). Why does smoking so often produce dependence? A somewhat different view. (Commentary). [Electronic Version]. *Tobacco Control*, 10, 62-64.
- Hughes, J. R., Oliveto, A. H., Riggs, R., Kenny, M., Liguori, A., Pillitteri, J. L., & MacLaughlin, M. A. (2004). Concordance of different measures of nicotine dependence: Two pilot studies. [Electronic Version]. *Addictive Behaviors*, 29, 1527-1539.
- Jackson, C. J., & Francis, L. J. (1999). Interpreting the correlation between neuroticism and lie scale scores. [Electronic Version]. *Personality and Individual Differences*, 26, 59-63.
- Jamrozik, K. (2004). Population strategies to prevent smoking. In J. Britton (Ed.). *ABC of Smoking Cessation* (pp. 27-31). USA: Blackwell Publishing.
- Jarvis, M. J. (2004). ABC of smoking cessation. [Clinical review]. [Electronic Version]. *British Medical Journal*, 328.
- John, U., Meyer, C., Rumpf, H. J., & Hapke, U. (2003). Probabilities of alcohol high-risk drinking, abuse or dependence estimated on grounds of tobacco smoking and nicotine dependence. [Research Report] [Electronic Version]. *Addiction*, 98, 805-814.
- John, U., Meyer, C., Rumpf, H. J., & Hapke, U. (2004). Smoking, nicotine dependence and psychiatric co-morbidity – A population based study including smoking cessation after 3 years. *Drug and Alcohol Dependence*, 76, 287-295.
- Johnson, J. L., Bottoroff, J. L., Moffat, B., Ratner, P. A., Shoveller, J. A., & Lovato, C. Y. (2003). Tobacco dependence: Adolescents' perspectives on the need to smoke. [Electronic Version]. *Social Science & Medicine*, 56, 1481-1492.
- Joseph, S., Manafi, E., Iakovaki, A. M., & Cooper, R. (2003). Personality, smoking motivation, and self-efficacy to quit. [Electronic Version]. *Personality and Individual Differences*, 34, 749-758.
- Kaplan, H. I., & Sadock, B. J. (1998). *Synopsis of psychiatry: Behavioural sciences/Clinical psychiatry*. (8th ed.). Philadelphia: Lippincott Williams & Wilkins.

- Kawakami, N., Takai, A., Takatsuka, N., & Shimizu, H. (2000). Eysenck's personality and tobacco/nicotine dependence in male ever-smokers in Japan. [Electronic Version]. *Addictive Behaviors, 22*(4), 585-591.
- Kawakami, N., Takatsuka, N., Inaba, S., & Shimizu, H. (1999). Development of a screening questionnaire for tobacco/nicotine dependence according to the ICD-10, DSM-III-R, and DSM-IV. [Electronic Version]. *Addictive Behaviors, 24*(2), 155-166.
- Kenford, S. L., Smith, S. S., Wetter, D. W., Jorenby, D. E., Fiore, M. C., & Baker, T. B. (2002). Predicting relapse back to smoking: Contrasting affective and physical models of dependence. [Electronic Version]. *Journal of Consulting and Clinical Psychology, 70*(1), 216-227.
- Killen, J. D., Fortmann, S. P., Schatzberg, A., Hayward, C., & Varady, A. (2003). Onset of major depression during treatment for nicotine dependence. [Electronic Version]. *Addictive Behaviors, 28*, 461-470.
- Kozlowski, L. T., Director, J., & Harford, M. A. (1981). Tobacco dependence, restraint and time to the first cigarette of the day. [Electronic Version]. *Addictive Behaviors, 4*, 307-312.
- Kozlowski, L. T., Henningfield, J. E. & Brigham, J. (2001). *Cigarettes, nicotine & health: A biobehavioural approach*. London: Sage Publications.
- Kypri, K., Baxter, J. (2004). Smoking in a New Zealand university student sample. [Electronic Version]. *The New Zealand Medical Journal, 117*(1190), 794-800.
- Laugesen, M. (1997). *Reducing tobacco use, exposure to environmental smoke and their adverse health consequences*. New Zealand: Midland Regional Health Authority.
- Laugesen, M. (2000). *Tobacco Statistics 2000*. Wellington: Cancer Society of New Zealand.
- Laugesen, M., Scollo, M., Sweanor, D., Shiffman, S., Gitchell, J., Barnsley, K., et al. (2000). World's best practice in tobacco control. [Electronic Version]. *Tobacco Control, 9*, 228-236.
- Laugesen, M., & Swinburn, B. (2000). New Zealand's tobacco control programme 1985-1998. [Electronic Version]. *Tobacco Control, 9*, 155-162.
- Lerman, C., Caporaso, N. E., Audrain, J., Main, D., Bowman, E. D., Lockshin, B., Boyd, N. R., & Shields, P. G. (1999). Evidence suggesting the role of specific genetic factors in cigarette smoking. [Electronic Version]. *Health Psychology, 18*(4), 14-20.
- Lindstrom, M. (2001). Desire to stop smoking among intermittent and daily smokers: A population based study [Letter to the Editor]. [Electronic Version]. *Tobacco Control, 10*(4), 396-398.
- Lindstrom, M., & Isacson, S-O. (2002). Long term and transitional intermittent smokers: A longitudinal study. [Electronic Version]. *Tobacco Control, 11*(1), 61-68.
- Lindstrom, M., & Ostergren, P-O. (2001). Intermittent and daily smokers: Two different socio-economic patterns, and diverging influence of social participation. [Electronic Version]. *Tobacco Control, 10*, 258-266.
- Lynn, R. & Martin, T. (1997). Gender differences in extraversion, neuroticism, and psychoticism in 37 nations. [Electronic Version]. *The Journal of Social Psychology, 137*(3), 369-373.
- Lowenstein, G. (2001). The visceral account of addiction. In P. Slovic, (Ed.), *Smoking: Risk, perception and policy*. (pp. 159-188). USA: Sage Publications.

- Lopez, A., Barcelona, E. U., de Psicologia, F., & Maldonado, G. J. (2001). Smoking and schizotypy [Abstract]. [Electronic Version]. *Psicothema*, 13,1.
- Madden, P. A. F., Bucholz, K. K., Dinwiddie, S. H., Slutske, W. S., Bierut, L. J., Statham, D. J., Dunne, M. P., Martin, N. G., & Heath, A. C. (1997). Nicotine withdrawal in women. [Research Report] [Electronic Version]. *Addiction*, 92(7), 889-902.
- Maori Smokefree Coalition (2003). *National Maori Tobacco Control Strategy 2003-2007*. Wellington: Aparangi Tautoko Auahi Kore.
- Martin, D. S. (1990). Physical dependence and attribution of addiction among cigarette smokers. [Brief Report] [Electronic Version]. *Addictive Behaviors*, 15, 69-72.
- McClellan, V. (1987). *A national survey of the smoking habits of form one students in New Zealand schools*. Wellington: Department of Health.
- McKerracher, D. W., Rich, P., & Niven, B. (1988). The relevance of the Eysenck Personality Questionnaire in a New Zealand student population. *New Zealand Journal of Psychology*, 17, 41-43.
- Ministry of Health. (1999a). *Our health, our future: Hauroa pakiri, Koiora roa., the health of New Zealanders 1999*. Wellington: Ministry of Health.
- Ministry of Health. (1999b). *Taking the pulse: The 1996/97 New Zealand Health Survey*. Wellington: Ministry of Health.
- Ministry of Health. (2000). *Trends in cigarette smoking and purchasing by fourth form students in New Zealand, 1992, 1997 and 1998*. Wellington: Ministry of Health.
- Ministry of Health. (2001a). *Inhaling inequality: Tobacco's contribution to health inequality in New Zealand*. Wellington: Ministry of Health.
- Ministry of Health. (2001b) *Tobacco Facts May 2001*. Retrieved June 25, 2004, from, [www.moh.govt.nz/moh.nsf/7004be0c19a98f8a4c25692e007bf833?SearchView](http://www.moh.govt.nz/moh.nsf/7004be0c19a98f8a4c25692e007bf833?SearchView)
- Ministry of Health. (2003). *Tobacco Facts: Public Health Intelligence Occasional Report No. 20*. Wellington: Ministry of Health.
- Ministry of Health and the Cancer Society of New Zealand. (1996). *Tobacco Statistics 1996*. Wellington: Ministry of Health.
- Moolchan, E. T., Radzius, A., Epstein, D. H., Uhl, G., Gorelick, D. A., Cadet, J. L., et al. (2002). The Fagerstrom Test for Nicotine Dependence and the Diagnostic Interview Schedule: Do they diagnose the same smokers? [Electronic Version]. *Addictive Behaviors*, 27, 101-113.
- Morris, C. G. (1996). *Psychology an introduction*. (9th ed.). London: Prentice-Hall
- National Advisory Committee on Health and Disability. (1999) *Guidelines for smoking cessation*. Wellington: National Health Committee.
- New Zealand National Drug policy. (n.d.). Retrieved August 7, 2004, from <http://www.ndp.govt.nz/tobacco/smokefreelaw/smokefreelawoverviewDec03.html>
- Nishith, P., Mueser, K. T., & Gupta, P. (1994). Personality and hallucinogen abuse in a college population from India. [Electronic Version]. *Personality and Individual Differences*, 17(4), 561-563.

- O'Byrne, K. K., Haddock, C. K., Poston, W. S. C., & Mid America Heart Institute. (2002). Parenting style and adolescent smoking. [Electronic Version]. *Journal of Adolescent Health, 30*, 418-425.
- O'Loughlin, J., DiFranza, J., Tarasuk, J., Meshefedjian, G., McMillan-Davey, E., Paradis, G., Tyndale, R. F., Clarke, P., & Hanley, J. (2002). Assessment at nicotine dependence symptoms in adolescents: A comparison of five indicators. [Electronic Version]. *Tobacco Control, 11*(4), 354-361.
- O'Loughlin, J., Kischuk, N., DiFranza, J., Tremblay, M., & Paradis, G. (2002). The hardest thing is the habit: A qualitative investigation of adolescent smokers' experience of nicotine dependence. [Electronic Version]. *Nicotine and Tobacco Research, 4*, 201-209.
- Ontario University (2005). *Leave the pack behind*. Retrieved August 23, 2004, from Otario University Web site <http://www.leavethepackbehind.org/>
- Papakyriazi, E., & Joseph, S. (1998). Individual differences in personality among smokers and their association with smoking motivation, social skills deficit, and self-efficacy to quit. [Electronic Version]. *Personality and Individual Differences, 25*, 621-626.
- Patton, D., Barnes, G. E., & Murray, R. P. (1993). Personality characteristics of smokers and ex-smokers. [Electronic Version]. *Personality and Individual Differences, 15*(6), 653-664.
- Patton, D., Barnes, G. E., & Murray, R. P. (1997). A personality typology of smokers. [Electronic Version]. *Addictive Behaviors, 22*, 269-273.
- Perkins, K. A., Broge, M., Gerlach, D., Sanders, M., Grobe, J. E., Cherry, C., et al. (2002). Acute nicotine reinforcement, but not chronic tolerance, predicts withdrawal and relapse after quitting smoking. [Electronic Version]. *Health Psychology, 21*(4), 332-339.
- Peto, R., Lopez, A. D., Boreham, J., Thun, M., & Heath, C. (1992). Mortality from tobacco in developed countries: Indirect estimation from national vital statistics. *The Lancet, 339*, 1268-1278.
- Pomerleau, O. F., Collins, A. C., Shiffman, S., & Pomerleau, C. S. (1993). Why some people smoke and others do not: New perspectives. [Electronic Version]. *Journal of Consulting and Clinical Psychology, 61*(5), 723-731.
- Prokhorov, A. V., De Moor, C., Pallonen, U. E., Hudmon, K. S., Koehly, L., & Hu, S. (2000). Validation of the modified Fagerstrom Tolerance Questionnaire with salivary cotinine among adolescents. [Electronic Version]. *Addictive Behaviors, 25*(3), 429-433.
- Radzius, A., Gallo, J. J., Epstein, D. H., Gorelick, D. A., Cadet, J. L., Uhl, G. E., & Moolchan, E. T. (2003). A factor analysis of the Fagerstrom Test for Nicotine Dependence (FTND). [Brief Report]. [Electronic Version]. *Nicotine and Tobacco Research, 5*, 255-260.
- Reeder, A. I., Williams, S., & Poulton, R. (2001). Nicotine dependence and attempts to quit or cut down among young adult smokers, *New Zealand Medical Journal, 114*, 403-406.
- Riedel, B. W., Robinson, L. A., Klesges, R. C., & McLain-Allen, B. (2003). Ethnic differences in smoking withdrawal effects among adolescents. [Electronic Version]. *Addictive Behaviors, 28*, 129-140.
- Rigotti, N. A., Amsten, J. H., McKool, K. M., Wood-Reid, K. M., Pasternak, R. C., & Singer, D. E. (2000). [Electronic Version]. *Preventive Medicine, 31*, 159-166.
- Ritchey, P. N., Reid, G. S., & Hasse, L. A. (2001). The relative influence of smoking on drinking and drinking on smoking among high school students in a rural tobacco-growing county. [Electronic Version]. *Journal of Adolescent Health, 29*, 386-394.

- Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. [Electronic Version]. *Psychological Bulletin*, 126(1), 3-25.
- Rohde, P., Lewinsohn, P. M., Brown, R. A., Gan, J. M., & Kahler, C. W. (2003). Psychiatric disorders, familial factors and cigarette smoking: Associations with smoking initiation. *Nicotine and Tobacco Research*, 5, 85-98.
- Sabol, S. Z., Nelson, M. L., Fisher, C., Gunzerath, L., Brody, C. L., Hu, S., Sirota, L. A., Marcus, S. E., Greenberg, B. D., Lucas IV, F. R., Benjamin, J., Murphy, D. L., & Hamer, D. H. (1999). A genetic association for cigarette smoking behavior. [Electronic Version]. *Health Psychology*, 18(1), 7-13.
- Saggino, A. (2000). The big three or the big five? A replication study. [Electronic Version]. *Personality and Individual Differences*, 28, 879-886.
- Samet, J. M. (2001). The risks of active and passive smoking. In P. Slovic, (Ed.), *Smoking: Risk, perception and policy*. (pp. 3-29). USA: Sage Publications.
- Scollo, M., Lal, A., Hyland, A., & Glantz, S. (2003). Review of the quality of studies on the economic effects of smoke-free policies on the hospitality industry. (Review). *Tobacco Control*, 12.1, 13-21.
- Shadel, W. G., Niaura, R., Goldstein, M. G. & Abrams, D. B. (2000). Does the Five Factor Model of personality apply to smokers? A preliminary investigation. [Electronic Version]. *Journal of Applied Biobehavioral Research*, 5, 114-120.
- Shadel, W. G., Shiffman, S., Niaura, R., Nichter, M., & Abrams, D. B. (2000). Current models of nicotine dependence: What is known and what is needed to advance understanding of tobacco etiology among youth. [Electronic Version]. *Drug and Alcohol Dependence*, 59(Suppl. 1) 9-21.
- Shatz, S. M. (2004). The relationship between Horney's three neurotic types and Eysenck's model of personality. [Electronic Version]. *Personality and Individual Differences*, 37, 1255-1261.
- Shiffman, S., Kassel, J. D., Paty, J., Gnys, M., & Zettler-Segal, M. (1994). Smoking typology profiles of chippers and regular smokers. [Electronic Version]. *Journal of Substance Abuse*, 6, 21-35.
- Shiffman, S., Paty, J. A., Kassel, J. D., Gnys, M., & Zettler-Segal, M. (1994). Smoking behavior and smoking history of tobacco chippers. [Electronic Version]. *Experimental and Clinical Psychopharmacology*, 2(2), 126-142.
- Shiffman, S. & Sayette, M. A. (2005). Validation of the Nicotine Dependence Syndrome Scale (NDSS): A criterion group design contrasting chippers and regular smokers. *Drug and Alcohol Dependence*, 79, 45-52.
- Siahpush, M., Borland, R., Scollo, M. (2003). Smoking and financial stress. *Tobacco Control*, 12(1), 60-67.
- Sigurdsson, J. F., & Gudjonsson, G. H. (1996). Psychological characteristics of juvenile alcohol and drug users. [Electronic Version]. *Journal of Adolescence*, 19, 41-46.
- Siqueira, L. M., & Brook, J. S. (2003). Tobacco use as a predictor of illicit drug use and drug-related problems in Colombian youth. [Electronic Version]. *Journal of Adolescent Health*, 32(50), 50-57.
- Spielberger, C. D. (1986). Smoking personality and health. In S. Modgil & C. Modgil. (Eds.) *Hans Eysenck: Consensus and controversy* (pp. 305-317). London: The Falmer Press.

- Spielberger, C. D., & Jacobs, G. A. (1982). Personality and smoking behaviour. [Electronic Version]. *Journal of Personality Assessment*, 46(4), 396-403.
- Spielberger, C. D., Reheiser, E. C., Foreyt, J. P., Poston, W. S., & Volding, D. C. (2004). Personality determinants of the use of tobacco products. [Electronic Version]. *Personality and Individual Differences*, 36, 1073-1082.
- Stanton, W. R. (1995). DSM-III-R tobacco dependence and quitting during late adolescence. [Electronic Version]. *Addictive Behaviors*, 20(5), 595-603.
- Stanton, W. R., Silva, P. A., & Oei, T. P. S. (1989). *The origins and development of an addictive behaviour: A longitudinal study of smoking*. Dunedin: University of Otago Medical School.
- Steinberg, M. L., Williams, J. M., Steinberg, H. R., Krejci, J. A., & Ziedonis, D. M. (2005). Applicability of the Fagerstrom Test for Nicotine Dependence in smokers with schizophrenia. [Electronic Version]. *Addictive Behaviors*, 30, 49-59.
- Strong, D. R., Brown, R. A., Ramsey, S. E., Myers, M. G. (2003). Nicotine dependence measures among adolescents with psychiatric disorders: Evaluating symptom expression as a function of dependence severity. [Electronic Version]. *Nicotine & Tobacco Research*, 5(5), 735-746.
- Teeson, M., Degenhardt, L., & Hall, W. (2002). *Clinical Psychology, a modular course: Addictions*. United Kingdom: Psychology Press Ltd.
- Te Puni Kokiri. (1999). *Maori Smoking Patterns*. Wellington: Te Puni Kokiri.
- Terracciano, A., & Costa, P. T., Jr. (2004). Smoking and the five-factor model of personality. [Electronic Version]. *Addiction*, 99, 472-481.
- Thomson, G. W., Wilson, N. A., O'Dea, D., Reid, P. J., & Howden-Chapman, P. (2002). Tobacco spending and children in low income households. [Electronic Version]. *Tobacco Control*, 11(4), 372-376.
- Tiffany, S. T., & Drobes, D. J. (1991). The development and initial validation of a questionnaire on smoking urges. [Electronic Version]. *British Journal of Addiction*, 86, 1467-1476.
- Tobacco Control Research Strategy Steering Group. (2003). *A tobacco control research strategy for New Zealand*. New Zealand: Ministry of Health.
- Tobias, M., & Cheng, J. (2001). *Inhaling inequality, tobacco's contribution to health inequality in New Zealand*. Wellington: Ministry of Health.
- United States Department of Health and Human Services. (1988). *The health consequences of smoking: Nicotine addiction. A report to the Surgeon General*. USA: United States Department of Health and Human Services.
- Unger, J. B., & Chen, X. (1999). The role of social networks and media receptivity in predicting age of smoking initiation: A proportional hazards model of risk and protective factors. [Electronic Version]. *Addictive Behaviors*, 24(3), 371-381.
- Vollrath, M., & Torgersen, S. (2002). Who takes health risks? A probe into eight personality types. [Electronic Version]. *Personality and Individual Differences*, 32, 1185-1197.
- Watkins, S. S., Koob, G. F., & Markou, A. (2000). Neural mechanisms underlying nicotine addiction: Acute positive reinforcement and withdrawal. [Electronic Version]. *Nicotine and Tobacco Research*, 2, 19-37.

- West, R. (2004). Assessment of dependence and motivation to stop smoking. In J. Britton (Ed.), *ABC of Smoking Cessation* (pp.7-9). USA: Blackwell Publishing.
- Williams, J. M., & Ziedonis, D. (2004). Addressing tobacco among individuals with a mental illness or an addiction. [Electronic Version]. *Addictive Behaviors*, 29, 1067-1083.
- Wilson, G., Field, A., & Wilson, N. (2001). Smoke gets in your eyes: Smoking and visual impairment in New Zealand. [Electronic Version]. *New Zealand Medical Journal*, 114, 471-474.
- Wonnacott, S., Sidhpura, N., & Balfour, D. J. K. (2005). Nicotine: From molecular mechanisms to behaviour. [Electronic Version]. *Current Opinion in Pharmacology*, 5, 53-59.
- Woodward, A., & Laugesen, M. (2001). How many deaths are caused by second hand cigarette smoke? [Electronic Version]. *Tobacco Control*, 10(4), 383-389.
- Woody, G. E., Cottler, L. B., & Cacciola, J. (1993). Severity of dependence: Data from the DSM-IV field trials. [Electronic Version]. *Addiction*, 88, 1573-1579.

## APPENDIX A

### PERSONALITY AND OTHER FACTORS OF SMOKERS AND NON-SMOKERS

#### Information Sheet

I would like to invite you to participate in this research project. This project is being undertaken to fulfil the requirements of a Masters Thesis for the Master of Arts in Psychology.

Researcher: **Mette Hansen-Reid**                      Supervisor:                      Dr Dave Clarke  
Contact Details: [REDACTED]                      Contact Details:                      443 9799 ext 9075

This self-report questionnaire is designed to gather information about cigarette smoking behaviour in New Zealand University Students. The purpose is to allow the identification of predictor variables for smoking behaviour in order to support cessation planning.

Completion and return of questionnaire implies consent. You have the right to decline to answer any particular question.

- Please feel free to ask questions either before the questionnaire is distributed, during completion of the questionnaire or after it has been returned.
- Confidentiality and anonymity will be maintained by not gathering identifiable personal information.
- It is expected that the questionnaire can be completed within twenty minutes.
- Non-participation will NOT have any impact on class work.
- Only summary data will be used for thesis preparation, publication and review. Data will be stored under locked conditions within the Massey Albany Psychology Department and disposed of by the supervisor after the required 5-year term.
- Research findings will be posted on the Psychology Department Notice Board, Albany campus. A summary sheet can also be obtained by printing your name and address on the envelope provided. This will be posted to you on completion of the project.
- Questionnaires and envelopes should be placed in the boxes provided in the Atrium Psychology Office, when they have been completed.

Should the completion of this questionnaire cause you any discomfort, please contact the Massey University Albany Health and Counselling Centre for support and information on 443-9783. Please feel free to contact the researcher or supervisor directly if you have any questions about this project.

This project has been reviewed and approved by the Massey University Human Ethics Committee, ALB Protocol No 03/011. If you have any concerns about the conduct of this research, please contact Associate Professor Kerry P Chamberlain, Chair, Massey University Campus Human Ethics Committee: Albany, telephone 443-9700 x9078, email K.Chamberlain@massey.ac.nz.

**THANK YOU SO MUCH FOR YOUR CONTRIBUTION TO THIS RESEARCH**

**APPENDIX B****PERSONALITY AND OTHER FACTORS OF SMOKERS AND NON-SMOKERS**

## SECTION A

**Completion and return of questionnaire implies consent**(For each question please circle the *number* you most identify with, or *fill in the blank*)

1. Gender
  - 1 Male
  - 2 Female
  
2. Age \_\_\_\_\_ (years)
  
3. Ethnicity
  - 1 European
  - 2 Māori
  - 3 Pacific Islander
  - 4 Asian
  - 5 Other \_\_\_\_\_
  
4. Income
  - 1 Low income/beneficiary
  - 2 Middle income
  - 3 Moderately high income
  - 4 High income
  
5. Which category best describes your experience with cigarette smoking?
  - 1 Non-smoker
  - 2 Daily smoker
  - 3 Occasional smoker
  - 4 Former smoker
  - 5 Potential smoker
  
6. Do you have one or more parents who smoke? Yes<sup>1</sup> / No<sup>2</sup>
  
7. Do you have one or more close friends who smoke? Yes<sup>1</sup> / No<sup>2</sup>
  
8. Do you have one or more siblings who smoke? Yes<sup>1</sup> / No<sup>2</sup>
  
9. Do you have a partner who smokes? Yes<sup>1</sup> / No<sup>2</sup>
  
10. Have you ever tried cigarette smoking – even a puff? Yes<sup>1</sup> / No<sup>2</sup>  
 If yes – How old were you? (in years). \_\_\_\_\_

CURRENT SMOKERS - Please go to question 11, next page.

FORMER SMOKERS - Please go to question 18, page 3.

NON-SMOKERS - Please go to SECTION B, page 4.

*This page of questions applies to CURRENT cigarette smokers only*

11. At what age (in years) did you start smoking regularly?  
\_\_\_\_\_
12. How many cigarettes a day do you smoke?  
\_\_\_\_\_
13. If you do not smoke daily how many cigarettes do you smoke weekly?  
\_\_\_\_\_
14. How soon after you wake up do you smoke your first cigarette? (circle one).  
1 Within 5 minutes  
2 6-30 minutes  
3 31-60 minutes  
4 after 60 minutes
15. Would you consider yourself nicotine dependent? Yes<sup>1</sup> / No<sup>2</sup>
16. How many times have you tried to quit smoking, for at least 24 hours, in the past year?  
\_\_\_\_\_
17. Have you ever experienced any of the following symptoms within 24 hours of quitting smoking or being in a situation where smoking was not permitted (Please circle all symptoms that you experienced.)  
1 Depressed mood  
2 Insomnia  
3 Irritability, frustration or anger  
4 Anxiety  
5 Difficulty concentrating  
6 Restlessness  
7 Decreased heart rate  
8 Increased appetite/weight gain  
9 Distress or impairment in social or work situations related to smoking cessation

**PLEASE CONTINUE ON TO SECTION B, PAGE 4**

*This page of questions applies to FORMER cigarette smokers only*

18. At what age (in years) did you start smoking regularly?  
\_\_\_\_\_
19. How many cigarettes a day did you smoke?  
\_\_\_\_\_
20. If you did not smoke daily how many cigarettes did you smoke weekly?  
\_\_\_\_\_
21. How soon after you woke up did you smoke your first cigarette? (circle one).  
 1 Within 5 minutes  
 2 6-30 minutes  
 3 31-60 minutes  
 4 After 60 minutes
22. Would you consider that you were nicotine dependent? Yes<sup>1</sup> / No<sup>2</sup>
23. How many times would you have tried to quit smoking, for at least 24 hours, in the last year that you smoked? \_\_\_\_\_
24. Did you ever experience any of the following symptoms within 24 hours of quitting smoking or being in a situation where smoking was not permitted (Please circle all symptoms that you experienced)  
 1 Depressed mood  
 2 Insomnia  
 3 Irritability, frustration or anger  
 4 Anxiety  
 5 Difficulty concentrating  
 6 Restlessness  
 7 Decreased heart rate  
 8 Increased appetite/weight gain  
 9 Distress or impairment in social or work situations related to smoking cessation

**PLEASE CONTINUE ON TO SECTION B, PAGE 4**

(Secion B contained the EPQ-R)

## APPENDIX C

December 2003

Dear Participant,

### PERSONALITY AND OTHER FACTORS OF SMOKERS AND NON-SMOKERS

First of all I must apologise for the delay in providing you with this feedback. I have had to return to part time status in order to fulfil family and work commitments.

Due to ethical committee guidelines I was unable to provide you with individual feedback regarding EPQ-R scores. I have endeavoured to provide a broad overview of the final results and hope that you find the outcomes interesting.

- 120 participants completed the questionnaire.
- Participant smoking status included:
  - Non-smoker 53.3%
  - Daily smoker 20.0%
  - Occasional smoker 9.2%
  - Former smoker 17.5%
- 76.7% had tried smoking between the ages of 7 and 35 years
- 68% of the sample were female
- 65% of participants estimate they are on a low income
- 32% have parents who smoke
- 75% have friends who smoke
- 34% have siblings who smoke
- 14% of participants had a partner who smokes
- 63.3% of current and occasional smokers consider themselves to be nicotine dependent, irrespective of gender, this closely resembles the figure of 63.6% for former smokers

Within the sample, 73% of males and 43% of females were non-smokers while occasional smokers were exclusively female. Former smokers were predominantly female (22.2%, compared to 8%), whereas daily smokers were similar across the genders (18.9% males and 21% of females).

Results of the Eysenck Personality Questionnaire (EPQ-R) indicated that smokers and non-smokers differed significantly on particular personality factors.

The EPQ-R also contains an Addiction Scale, which has previously been shown to distinguish individuals with bulimia, problem drinking and drug addiction. My findings showed that the Addiction Scale was able to distinguish smokers from non-smokers although scores were markedly lower for smokers than other substance users. Daily smokers had significantly higher tough-mindedness (P) and extraversion (E) scores ( $p < .001$ ) than non-smokers. Extroverts are considered more likely to be sociable, have many friends, prefer company to solitary activities, may be impulsive and seek excitement. The trait of tough-mindedness is related to being insensitive and lacking of feeling, at the extreme end of the continuum.

While scores on the EPQ-R identified smokers as significantly higher on the E and P trait than non-smokers, these findings were still considerably lower than the threshold for drug addicts.

There were no gender differences in the perception of nicotine dependence among current smokers, with 63.3% of smokers considering themselves to be nicotine dependent. While smokers were more likely to have a friend, partner or sibling who smokes, the relationship between having a parent who smokes and current smoking behaviour was not significant.

Your participation in this research has allowed me to establish an original finding that the EPQ-R Addiction Scale can be used to successfully distinguish daily smokers from non-smokers. The finding of daily smokers having higher P and E scores than non-smokers differs from previous outcomes for other addictive behaviours, which generally predict elevated P and N (emotionality) scores. These outcomes have provided a successful result that will enable me to complete a worthwhile thesis.

Thank you for your participation in my study, *Merry Christmas* and best wishes for the New Year.

Yours sincerely

Mette Hansen-Reid