THE RELATIONSHIP BETWEEN SMOKING CESSATION, DEPRESSION AND WEIGHT GAIN: A MIXED METHOD STUDY

Amer Siddiq Amer Nordin

A thesis submitted for the degree of

Doctor of Philosophy

at

University of Otago,
Christchurch, New Zealand

March, 2018
Abstract

Introduction

Public health measures have been effective in many countries including New Zealand in reducing the prevalence of smoking, but smokers with co-existing problems, including mental illnesses, are now becoming a focus for reducing smoking rates further. A key clinical dilemma is the inter-relationship between smoking cessation, depression and weight gain, on which there is currently limited understanding.

Aims and Objective

This study was aimed to investigate the relationship between smoking cessation, depression and weight gain; and also to explore the experiences of participants attending a smoking cessation program in Christchurch through the Smoking Cessation, Mood and Eating Study (SCeMES).

Methodology

The SCeMES was a mixed method study involving the quantitative study (SCeMES-QN) and the qualitative study (SCeMES-QL), conducted sequentially. Participants were recruited from an on-going clinical trial in Christchurch, the Zonnic and Patch Study (ZAP). Follow-up for SCeMES-QN were for one year and data collected at five separate occasions face-to-face. Information for depression, weight and both retention and abstinence rates were collected on all visits. Descriptive analysis was performed and where applicable univariate and multivariate analysis was conducted using the Statistical Package for Social Sciences (SPSS) version 20. Visits were grouped to baseline, EARLY and LATE. Participants for SCeMES-QL were recruited purposively from SCeMES-QN. Data was collected through individual and focus group interviews using a semi–structured interview guide. A general inductive approach was used for analysis with the assistance of the software NVivo. This study was approved by the local Ethics Committee.

Results

A total of 256 participants were recruited for SCeMES-QN and 25 for SCeMES-QL. The retention rate at EARLY follow-up (M = 94 days) was 48.4% and LATE follow-up
(M = 380) was 37.6%; and the quit rate was 14.5% and 14.8% respectively. Thirty-five point seven percent reported a previous history of depression and current depression was low (2.3% and 6.6% using two different measures). The mean weight was 79.9kgs and the average BMI 27.4. Only 0.8% of the participants were considered to fulfil the criteria for food addiction at baseline with no significant cases detected at follow-ups. Overall, participants gained weight from baseline at EARLY and LATE follow-ups by 1.3kg and 5.1kg respectively (p <0.001) and those abstinent at follow up had gained more (p<0.01). There was no association between mood or eating variables, and smoking cessation, found in this analysis. For SCeMES-QL, ‘smoking cessation’, ‘perceived prejudice’ and ‘unprecedented life event’ were the three major domains revealed by participants in their quit smoking journey.

**Discussion and Conclusion**

This study found lifetime prevalence of depression to be double the national average, however, current depression was lower. It was possible that the severity of illness affected participation in SCeMES and the findings were supported by the qualitative information where depression was barely mentioned as part of the smoking cessation journey. Abstinent participants gained more weight compared to those non-abstinence at follow-up, in keeping with other studies. The role of food addiction causing weight gain was not seen in this study. Weight gain was likely the result of increasing consumption as evidenced by the qualitative findings of increased appetite post quitting. Similar to previous studies, this study found no relationship between smoking cessation, depression and weight gain when analysed together. The SCeMES-QL participants reported their smoking cessation journey to be influenced by the Christchurch earthquakes and the New Zealand endgame agenda. To conclude, more research is needed in this important field of work to ensure a continued reduction in smoking prevalence.
I remember telling my sponsors in Malaysia when deciding to pursue my PhD studies in New Zealand: “Christchurch has no earthquakes,” when asked why I had chosen University of Otago, Christchurch to do my doctorate, having completed my medical degree from this same institution. How hollow those same words ring now.

I completed my medical degree in 2002 after living in New Zealand for six years. I did not experience a major earthquake throughout that whole time. After graduation I returned to Malaysia and served with the Ministry of Health before joining the Ministry of Higher Education in 2005. Malaysia, the country where I am currently based, is not situated within the “ring of fire” and hence does not experience earthquakes (or any natural disaster apart from floods). In 2009, after obtaining my Masters degree, which is also the exit examination to becoming a psychiatrist, I worked for a year as a full-fledged psychiatrist before enrolling to do a PhD in July 2010.

I remember that episode on the 4th of September 2010 vividly (magnitude 7.1). I was awake at the time and experienced a fierce shaking around 4.30 in the morning, a mere three months after my arrival. It was like the whole earth was shaking and for a minute I remember asking myself, “is this an earthquake?” I recall standing in the living room, frozen to the spot, not knowing what to do or how to react. After the shaking stopped, I collected my nerves (which were on the floor by then) and braved it outside to see what had happened. The scene in front of me was utter chaos as the buildings surrounding my unit in the middle of town had toppled over. Yet luckily, no one was hurt that morning. This unfortunately was not the same a few months later during the February 22nd, 2011 earthquake (magnitude of 6.3). One hundred and eighty-five lives were lost that afternoon. In this incident I was at the National Addiction Centre on the 3rd Floor of Terrace House, and coincidentally had stepped out to the pantry (I’m usually at my own desk at that time on most days). Had I been in my office, reflecting back, it was possible that I would have sustained some major injuries as a result of displaced furniture. Each earthquake has left its mark on me and also for the people of this city. Within a year of arriving in New Zealand, I had
moved three times as a direct result of the earthquake and was displaced for 14 weeks from both my home, and my place of work, due to infrastructure damage or building assessments. In fact, my first place of residence caught fire (seen on live television http://youtu.be/sNcS88eqMvs – the blue building next to the fire) and has since been demolished after additional damage from the second earthquake. The aftershocks were equally damaging and became a way of life in the ‘new’ Christchurch. We experienced more than 18,000 aftershock over the following 5 years. Finally, to add to the experience, Christchurch experienced its worst snow storm in 50 years in 2012, and worse flooding for a century in 2013.

My Masters thesis (titled: Depression and Myocardial Infarction) was on depression, and I was therefore interested in mood disorders. Weight and eating, on the other hand, were raised during my time with the National Addiction Centre (NAC). At the time, the NAC was doing research work in obesity which included the newly emerging concept: food addiction. My interest in looking at depression, and weight and eating, along with smoking cessation was partially coincidental. Although it was my aim to do work in smoking cessation, I was not a tobacco control researcher, clinician or advocate to begin with. I have since changed. Psychiatrists in Malaysia have never really been known to do work in smoking cessation, but surprisingly, as I later found out, the lack of involvement of psychiatrists in smoking cessation was not an isolated incident. My research revealed in general, that psychiatry has never taken smoking as seriously as other drugs of abuse although it is the most prevalent drug of abuse (A N Amer Siddiq, Adamson, & Sellman, 2015; Amer Nordin Amer Siddiq & Farizah, 2013). Only recently has the tobacco control community revisited this issue, particularly in high income countries (HIC), as smoking prevalence has been found to plateau, as conveyed later in this thesis.

For a country of 30 million, Malaysia has very few (< 50 people) tobacco control researchers. Amongst these, there are even fewer experts in smoking cessation (< 5 people). My mentor, the past Director of University Malaya Centre on Addiction Sciences (UMCAS), Professor Dr. Mohd. Hussain Habil, had observed this gap in the country for some time. He therefore, encouraged me to join the addiction psychiatry team in 2008 with the aim of developing research in nicotine addiction to support the national agenda (Malaysia Drug Free by 2015). Thus in 2009, the nicotine addiction research group of UMCAS was formed to develop research expertise in this area. In
order for this new group to survive, he then encouraged me to apply for a PhD and this was subsequently supported by the University of Malaya, my employer.

*In all great endeavours, timing is everything*  
Anonymous

At around the same time, after making my PhD intentions known, Professor Sellman emailed to inform me that there was an opening in a smoking cessation research program in Christchurch. The project was the Zonnic™ and Patch study (ZAP). Little did I know at the time, New Zealand and Australia were the global tobacco control leaders in research and advocacy efforts. In the same year of my arrival, the New Zealand government announced an aspirational goal to become smoke-free as a nation as early as 2025 (Smoke-free 2025). This announcement further boosted tobacco control research in New Zealand, even more than what was already happening at the time.

The Smoking Cessation, Mood and Eating Study (SCeMES) has provided me with the skills necessary in conducting a Mixed Method Research (MMR) and the appreciation of doing both quantitative and qualitative research together. It has also allowed me to appreciate the issues that surround both types of research work such as recruitment, follow-up, interviews and retention. The skills gleaned will assist me in future research work in the field. Conducting the research work in New Zealand, and being involved with tobacco control advocacy, has led me to be in a fortunate position as Malaysia declared in 2015 that the country aspires to be smoke free by 2045.
Acknowledgements

There are many people who need to be acknowledged for their part in the completion of this PhD thesis. First and foremost, I would like to thank my family who have been supporting me throughout this journey. My mother, Professor Dr Rahimah, and my father, Professor Amer Nordin, have both instilled in me since a young age the interest in doing academic work, including enrolling into a PhD. They have also supported me with their love and dedication to the cause over the past 5 years, always encouraging me to continue to finish the work despite the difficulties faced in New Zealand and the demanding challenges at the end of the journey in Malaysia. Together with my parents, I would like to thank the Amer family (all seven siblings) for their continuous love and support. In December 2012 I got married. I would therefore like to thank my wife, Doreen, who has had to endure a four-year long-term relationship, in which only one and a half years were as a married couple. I will forever be grateful for the sacrifice, and also the constant reminder to keep at it, although at times I wondered if it was all worth it.

This work would not be possible without the continuous encouragement, support and dedication of experts, who have given me considerable help along the way. Most important, were my two supervisors, Professor Doug Sellman and Associate Professor Simon Adamson. Together with my supervisors, Dr Ria Schroder and Professor Chris Frampton, both qualitative and statistical qualitative expert within the NAC who has helped me the most with the qualitative section of the study, and I thank Ria for her time and dedication. More importantly, all of them were very approachable, and I always felt safe to ask numerous questions during our discussion sessions.

A special thank you needs to be mentioned to the many sponsors that have funded my study and supported my work over the past 4 years. First are the University of Malaya (UM) management and human resource personnel who have allowed me to complete my PhD and have always been supportive and understanding. Among them are Tan Sri Professor Dr Gauth Jasmon, the recently retired Vice Chancellor, Tan Sri Professor Dr Amin Jalaludin, the current Vice Chancellor, Professor Dr Ahmad Hatim Sulaiman, my Head of Department, and the staff in the Human Resource Unit of UM. The university supported me fully in my final year of study when all my scholarships had ended. Second is the University of Otago for the
Postgraduate scholarship and research grant which helped me tremendously in my second and third years of study. A special mention is reserved for the NAC and Postgraduate Office staff in Christchurch, especially Lindsay Atkins, Lisa Andrews and Ruth Helms. Third is the Ministry of Higher Education, Malaysia, which funded the first year of my study in New Zealand.

Finally, thanks goes to my colleagues and friends in New Zealand, especially Dr James Foulds from the NAC, and Professor Dr Chris Bullen from the University of Auckland, who have always provided me with encouragement. I would like to also acknowledge my ‘comrades’ who were completing their PhD’s with me, Ms Peshali Fernando and Dr. Deidre Richardson, both of whom spent days and nights writing with me, weekends inclusive! The Malaysian community here in Christchurch have really assisted me throughout the 4 years. There are so many of these beautiful people and I thank you all. However, there are four that require special mention: Dr Afida Sohana who helped me adjust back to New Zealand when I first arrived, was with me throughout the earthquake period and gave me shelter when my house was inhabitable; the brothers, Iskandar and Emir Roseley who lent me their home for a year when housing was difficult to find and rent was tremendously expensive; and finally Dr Norhasfazilah, who similarly housed me in my last month in New Zealand, when short term accommodation was difficult to find.

This work would not have been able to be completed without the consent, support and understanding of the study participants. I hope that this work will be able to represent your trust in me during our time together. I also hope, as you did, that this work will help others to quit smoking and prolong their lives as healthy ‘Kiwis’. 
INTRODUCTION

CHAPTER 1 - Introduction ........................................................................................ 2
  1.1 Thesis Overview..............................................................................................2

LITERATURE REVIEW

CHAPTER 2 – Smoking ............................................................................................. 5
  2.1 Chapter Overview ..........................................................................................5
  2.2 Smoking, Nicotine Addiction and Tobacco Use Disorder .......................... 5
        2.2.1 Epidemiology ..................................................................................5
        2.2.2 Framework Convention on Tobacco Control ................................5
        2.2.3 Smoking Harm .............................................................................6
        2.2.4 Benefits of Smoking ......................................................................8
        2.2.5 Benefits of Quitting ................................................................. 9
  2.3 Smoking as an Addiction ............................................................................ 10
        2.3.1 Tobacco Use as a Disorder .......................................................... 10
        2.3.2 The Role of Nicotine ....................................................................11
        2.3.3 The Role of Genetics ...................................................................12
        2.3.4 The Role of Psychology ...............................................................12
        2.3.5 Nicotine Withdrawal ....................................................................13
  2.4 Psychiatry and Smoking ............................................................................. 13
        2.4.1 Psychiatrists and Tobacco Control ............................................. 15
  2.5 New Zealand and Tobacco Control ............................................................ 15
        2.5.1 New Zealand Smoking Developments ...................................... 15
        2.5.2 New Zealand Smoking Cessation Services .............................. 17
  2.6 Summary.......................................................................................................19

CHAPTER 3 - Literature Review: Smoking Cessation .......................................... 20
  3.1 Chapter Overview .........................................................................................20
  3.2 Definition and Overview .............................................................................20
  3.3 Predictors for smoking cessation .................................................................22
        3.3.1 General Predictors ........................................................................ 22
CHAPTER 6 – Literature Review: Smoking Cessation, Depression and Weight Gain ............................................................................................................. 82

6.1 Chapter Overview ............................................................................................................. 82
6.2 Overview ......................................................................................................................... 82
6.3 Does Weight Gain and Depression Influence Smoking Cessation Outcomes .............. 85
6.4 Study Rationale .............................................................................................................. 87
6.5 SCeMES Aims and Objectives ...................................................................................... 88

CHAPTER 7 - Methodology: Introduction, Concept and Rationale of use ............. 90

7.1 Chapter Overview .............................................................................................................. 90
7.2 Description of Mixed Methods Research ...................................................................... 90
7.2.1 Introduction ................................................................................................................. 90
7.2.2 Definition of Mixed Method .......................................................................................... 91
7.2.3 Paradigm or World View .............................................................................................. 92
7.2.4 Types of Mixed Method Research Designs ............................................................... 94
7.2.5 Benefits ....................................................................................................................... 95
7.2.6 Controversies and Critiques ......................................................................................... 95
7.3 Applying Mixed Methods to the SCeMES .................................................................. 97
7.4 Research design .............................................................................................................. 98
7.4.1 Areas of Mixing .......................................................................................................... 98
7.4.2 Justification for Using Sequential Explanatory Mixed Method .................................. 99
7.4.3 Ethics ............................................................................................................................ 99
7.5 The Researcher’s Role ...................................................................................................... 99
7.5.1 The Researcher ............................................................................................................ 100
7.5.2 The Christchurch Earthquakes .................................................................................. 100
7.6 Mixed Method Purpose Statement ............................................................................... 101

CHAPTER 8 - Smoking Cessation, Mood and Eating Study Quantitative (SCeMES-QN) Methodology ................................................................................. 102

8.1 Chapter Overview .............................................................................................................. 102
8.2 Research Design .............................................................................................................. 102
8.3 Zonnic™ and Patch (ZAP) Study .................................................................................... 102
8.4 Duration ........................................................................................................................... 102
8.5 Recruitment and Site ....................................................................................................... 103
8.6 Inclusion and Exclusion criteria ..................................................................................... 103
8.7 Measures .......................................................................................................................... 104
8.7.1 Objective Measurements: ......................................................................................... 104
8.7.2 Questionnaires: ........................................................................................................... 105
8.8 Data Collection ................................................................................................................ 109
8.8.1 Phase One ................................................................................................................... 109
8.8.2 Phase Two .................................................................................................................... 110
8.8.3 Phase Three ................................................................................................................ 110
### CHAPTER 9 - Smoking Cessation, Mood and Eating Study Qualitative (SCeMES-QL) Methodology

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1 Chapter Overview</td>
<td>114</td>
</tr>
<tr>
<td>9.2 Research Design</td>
<td>114</td>
</tr>
<tr>
<td>9.3 Recruitment and Sampling</td>
<td>114</td>
</tr>
<tr>
<td>9.4 Data Collection</td>
<td>115</td>
</tr>
<tr>
<td>9.4.1 Technique</td>
<td>115</td>
</tr>
<tr>
<td>9.4.2 Data Collection Strategies</td>
<td>117</td>
</tr>
<tr>
<td>9.4.3 Development of Interview Guide</td>
<td>119</td>
</tr>
<tr>
<td>9.4.4 Data Collection Site</td>
<td>121</td>
</tr>
<tr>
<td>9.4.5 Recording the Data</td>
<td>122</td>
</tr>
<tr>
<td>9.5 Ethical Considerations</td>
<td>122</td>
</tr>
<tr>
<td>9.6 Methods of Rigor</td>
<td>124</td>
</tr>
<tr>
<td>9.7 Reliability</td>
<td>124</td>
</tr>
<tr>
<td>9.8 Validation</td>
<td>125</td>
</tr>
<tr>
<td>9.9 Analysis</td>
<td>127</td>
</tr>
</tbody>
</table>

### RESULTS

### CHAPTER 10 - Quantitative Results (SCeMES-QN)

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1 Chapter Overview</td>
<td>130</td>
</tr>
<tr>
<td>10.2 General Sample Profile</td>
<td>130</td>
</tr>
<tr>
<td>10.3 Baseline Sample Description</td>
<td>131</td>
</tr>
<tr>
<td>10.3.1 Baseline Smoking Status</td>
<td>131</td>
</tr>
<tr>
<td>10.3.2 Baseline Sample Demographic Profile</td>
<td>132</td>
</tr>
<tr>
<td>10.3.3 Baseline Mood Status</td>
<td>132</td>
</tr>
<tr>
<td>10.3.4 Baseline Eating Status</td>
<td>132</td>
</tr>
<tr>
<td>10.3.5 The Association Between Variables</td>
<td>133</td>
</tr>
<tr>
<td>10.4 Follow-up Sample Description</td>
<td>135</td>
</tr>
<tr>
<td>10.4.1 Follow-up Retention</td>
<td>135</td>
</tr>
<tr>
<td>10.4.2 Characteristics of Participants Who Did Not Attend Any Follow-up (n =116)</td>
<td>136</td>
</tr>
<tr>
<td>10.5 Retention in the Study</td>
<td>137</td>
</tr>
<tr>
<td>10.5.1 Characteristics of Participants at EARLY Follow-up (n =124)</td>
<td>137</td>
</tr>
<tr>
<td>10.5.2 Characteristics of Participants at LATE Follow-up (n =94)</td>
<td>140</td>
</tr>
<tr>
<td>10.5.3 Predictors for EARLY and LATE Follow-up</td>
<td>141</td>
</tr>
<tr>
<td>10.5.4 Stepwise Logistic Regression for EARLY Follow-up</td>
<td>142</td>
</tr>
<tr>
<td>10.5.5 Stepwise Logistic Regression for LATE Follow-up</td>
<td>144</td>
</tr>
<tr>
<td>10.5.6 Summary</td>
<td>144</td>
</tr>
<tr>
<td>10.6 Smoking Cessation Outcome</td>
<td>145</td>
</tr>
<tr>
<td>10.6.1 Smoking Cessation Outcome on Follow-up</td>
<td>145</td>
</tr>
<tr>
<td>10.7 Mood</td>
<td>145</td>
</tr>
<tr>
<td>10.7.1 Depression Diagnosis and Quit status</td>
<td>146</td>
</tr>
<tr>
<td>10.7.2 Depression Diagnosis at EARLY and LATE Follow-up Visits</td>
<td>146</td>
</tr>
</tbody>
</table>
12.3.1 Outcome Measures .............................................................................. 203
12.3.2 Depression and Smoking Cessation Outcomes ............................... 204
12.3.3 Eating and Smoking Cessation ......................................................... 207
12.3.4 The Interrelationship between Depression, Weight and Smoking Cessation Outcomes ................................................................. 211
12.3.5 The Experiences of Smoking Cessation in the SCeMES .................. 211

12.4 Limitations and Strengths ..................................................................... 216
12.4.1 Limitations ....................................................................................... 216
12.4.2 Strengths .......................................................................................... 218
12.4.3 Future Research ............................................................................... 219
12.4.4 Implications for Practice ................................................................. 221

12.5 Conclusion ............................................................................................ 222

References ................................................................................................... 224

Appendix A - Publications and Presentations ............................................. 272
Appendix B - Ethics ....................................................................................... 301
Appendix C - Consent ................................................................................... 303
Appendix D - Questionnaires ....................................................................... 312
List of Tables

Table 3.1 Predictors for Smoking Cessation ................................................................................. 22
Table 4.1: Major depressive disorder symptoms for diagnosis using DSM-IV-TR and ICD-10 ........................................................................................................ 45
Table 4.2: Current smokers with previous history or lifetime depression .............................. 49
Table 4.3: Current smokers with current diagnosis of depression ........................................... 53
Table 4.4: Review article on depression and smoking cessation between 1980 – 2012 ...................................................................................................................................... 60
Table 8.1: Phases of Data Collection ........................................................................................... 109
Table 10.1: Reasons for exclusion from the ZAP Study (and SCEMES-QN) ......................... 131
Table 10.2: Correlation for smoking variables ........................................................................... 134
Table 10.3: Comparison between depression and eating variables for those attending baseline visit only (n =116) compared to any follow-up (n =140) ................ 137
Table 10.4: Association between demographic and smoking variables for EARLY (n =124) and lost to follow-up (n = 132) .............................................................. 139
Table 10.5: Association between mood and eating variables for EARLY (n=124) and lost to follow-up (n = 132)............................................................................. 140
Table 10.6: Association between demographic and smoking variables for LATE (n = 94) and lost to follow-up (n = 162) ................................................................. 141
Table 10.7: Demographic predictors of follow-up ................................................................. 142
Table 10.8: Smoking predictors of follow-up ............................................................................ 143
Table 10.9: Mood predictors of follow-up .......................................................... 143
Table 10.10: Eating predictors of follow-up ............................................................................. 144
Table 10.11: Prevalence of depression at four visits .................................................................. 146
Table 10.12: Prevalence of depression for EARLY and LATE follow-up ............................... 146
Table 10.13: Association between baseline mood variables and EARLY (n = 124) quit smoking outcome and LATE (n=94) ......................................................... 148
Table 10.14: Paired t-test Eating Variables Between Baseline and Follow-up ................. 149
Table 10.15 Association between baseline eating variables and EARLY quit smoking outcome .................................................................................................................. 153
Table 10.16: Diagnosis of food addiction at each visit ............................................................... 154
Table 10.17: Logistic regression for mood and eating and EARLY quit smoking outcome ...................................................................................................................... 155
Table 10.18: Logistic regression for mood and eating and LATE quit smoking outcome ........ 156
Table 11.1: Description of participants interviewed individually compared to those interviewed in FG ........................................................................................................ 162
Table 11.2: Abstainers compared to smokers in SCEMES-QL ................................................. 164
Table 11.3: Matrix display for the theme ‘The Outlook to Quitting’ ....................................... 170
Table 11.4: Matrix display for the theme Process of Quitting .................................. 182
Table 11.5: Matrix display for the theme Support .......................................................... 188
Table 11.6: Matrix display for the theme Prejudice ..................................................... 195
Table 11.7: Matrix display for the theme Prejudice ..................................................... 199

List of Figures

Figure 5.1: Arcuate POMC Neurons Integrate a Diverse Set of Excitatory and Inhibitory Signals Involved in the Central Regulation of Energy Balance ............... 72
Figure 7.1: The Purposive-Mixed Probability Sampling Continuum ......................... 93
Figure 7.2: Flow of MM Research Design ............................................................................. 98
Figure 8.1: Flow for the SCeMES-QN Data Collection ................................................. 110
Figure 9.1: Recruitment for SCeMES-QL ............................................................................. 115
Figure 10.1: HADSD mean score trend between baseline and follow-ups ............... 147
Figure 10.2: Mean weight at baseline, EARLY and LATE follow-up ......................... 149
Figure 10.3: Mean score QSCRF for baseline, EARLY and LATE follow-up ............... 150
Figure 10.4: Mean score NEEDNT between baseline, EARLY and LATE follow-up ................................................................. 151
Figure 10.5: Baseline and EARLY weight (kgs) and quit smoking outcome .......... 152
Figure 10.6: Baseline and LATE weight (kgs) and quit smoking outcome .............. 152
List of Publications and Presentations

Publications


Presentations

1. Weight, Food Addiction and Quitting Smoking., 18th Malaysian Conference on Psychological Medicine and the 1st Asian Federation of Psychiatrists Associations regional Meeting, 23 May 2014 to 24 May 2014, Malaysian Psychiatric Association


## Abbreviation List

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDNF</td>
<td>Brain Derived Neurotropic Factor</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>BRFSS</td>
<td>Behavioural Risk Factor Surveillance System</td>
</tr>
<tr>
<td>CES-D</td>
<td>Centre for Epidemiology Depression Scale</td>
</tr>
<tr>
<td>CHDS</td>
<td>Christchurch Health and Development Study</td>
</tr>
<tr>
<td>CIDI</td>
<td>The World Mental Health Composite International Diagnostic Interview</td>
</tr>
<tr>
<td>COI</td>
<td>Cost-of-illness</td>
</tr>
<tr>
<td>COPD</td>
<td>Chronic Obstructive Pulmonary Disease</td>
</tr>
<tr>
<td>CPD</td>
<td>Cigarettes per Day</td>
</tr>
<tr>
<td>DHB</td>
<td>District Health Board</td>
</tr>
<tr>
<td>DSM</td>
<td>Diagnostic Statistical Manual for Mental Illness</td>
</tr>
<tr>
<td>FCTC</td>
<td>Framework Convention on Tobacco Control</td>
</tr>
<tr>
<td>FDA</td>
<td>Food Drug Administration</td>
</tr>
<tr>
<td>FTND</td>
<td>Fagestrom Test for Tobacco Dependence</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>HIC</td>
<td>High Income Countries</td>
</tr>
<tr>
<td>ICD</td>
<td>International Classification for Disease</td>
</tr>
<tr>
<td>ITC</td>
<td>International Tobacco Control</td>
</tr>
<tr>
<td>LMIC</td>
<td>Low Middle Income Countries</td>
</tr>
<tr>
<td>MASC</td>
<td>Māori Affairs Select Committee</td>
</tr>
<tr>
<td>MC</td>
<td>Melanocortin System</td>
</tr>
<tr>
<td>MDD</td>
<td>Major Depressive Disorder</td>
</tr>
<tr>
<td>m-dep</td>
<td>Minor Depression</td>
</tr>
<tr>
<td>mYFAS</td>
<td>Modified Yale Food Addiction Scale</td>
</tr>
<tr>
<td>MI</td>
<td>Motivational Interviewing</td>
</tr>
<tr>
<td>MM</td>
<td>Mixed Methods Study</td>
</tr>
<tr>
<td>MSA</td>
<td>Master Settlement Agreement</td>
</tr>
<tr>
<td>nAchR</td>
<td>nicotinic acetylcholine receptors</td>
</tr>
<tr>
<td>NHANES</td>
<td>National Health and Nutrition Examination Survey</td>
</tr>
<tr>
<td>NHES</td>
<td>National Health Examination Survey</td>
</tr>
<tr>
<td>NHS</td>
<td>National Health Service</td>
</tr>
<tr>
<td>NPY</td>
<td>Neuropeptide-Y</td>
</tr>
<tr>
<td>NRT</td>
<td>Nicotine Replacement Therapy</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
</tr>
<tr>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td>PET</td>
<td>Positron Emission Tomography</td>
</tr>
<tr>
<td>PHO</td>
<td>Primary Health Organization</td>
</tr>
<tr>
<td>POMC</td>
<td>Pro-opiomelanocortin</td>
</tr>
<tr>
<td>POS</td>
<td>Point-of-Sale</td>
</tr>
<tr>
<td>RCT</td>
<td>Randomized Controlled Trials</td>
</tr>
<tr>
<td>RP</td>
<td>Relapse Prevention</td>
</tr>
<tr>
<td>SCeMES</td>
<td>The Smoking Cessation, Mood and Eating Study</td>
</tr>
<tr>
<td>SCeMES-QL</td>
<td>SCeMES – Qualitative Study</td>
</tr>
<tr>
<td>SCeMES-QN</td>
<td>SCeMES – Quantitative Study</td>
</tr>
<tr>
<td>SCID</td>
<td>Structural Clinical Interview for DSM-IV</td>
</tr>
<tr>
<td>SFE</td>
<td>Smoke-Free Environment Act</td>
</tr>
<tr>
<td>SHS</td>
<td>Second-hand smoking</td>
</tr>
<tr>
<td>SSRI</td>
<td>Serotonin Selective Reuptake Inhibitor</td>
</tr>
<tr>
<td>TTS</td>
<td>Tobacco Treatment Specialists</td>
</tr>
<tr>
<td>UN</td>
<td>United Nations</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>WMH</td>
<td>WHO World Mental Health Survey</td>
</tr>
<tr>
<td>YFAS</td>
<td>Yale Food Addiction Scale</td>
</tr>
</tbody>
</table>
INTRODUCTION
CHAPTER 1 - Introduction

1.1 Thesis Overview

At a high level United Nations (UN) meeting in 2012 concerns were raised regarding non-communicable diseases (NCDs), only the second time a health issue was discussed by the UN (Bonita et al., 2013). Specifically mentioned during the meeting were the concerns for tobacco, unhealthy eating and alcohol as major risk factors for health complications such as cardiovascular disease, chronic pulmonary lung diseases, mental illness and cancers.

The smoking epidemic is a crucial health problem today. The role of psychiatry and psychiatrists in the management of smoking was tenuous to say the least. It is important for tobacco control advocates to have a greater understanding on how tobacco use affects the mental health population. This is especially significant considering that New Zealand is one of the leading countries in tobacco control policy (Blakely, Thomson, Wilson, Edwards, & Gifford, 2010; Thomson, Edwards, Wilson, & Blakely, 2012). As more people become aware of the dangers of smoking and the benefits of quitting, they may also become motivated to quit.

Quitting smoking has been reported to lead to mood changes and weight gain (Ministry of Health, 2007). Although detrimental in their own right, both conditions have been reported to negatively impact quit attempts (Flegal, 2012; Ziedonis et al., 2008). More important was the relationship between quitting smoking, depression and weight gain and how these experiences affected, if any, those wanting to quit. Therefore a study was designed, using mixed methods research (MM), using both numbers and narrative, to investigate this observation in order to better understand this issue among smokers quitting in Christchurch.

The research work for this thesis was a study termed the Smoking Cessation, Mood and Eating Study (SCeMES). This study involved 256 smokers who were attempting to quit smoking in a smoking cessation program. The study also involved investigating the impact of depression and weight on participants wanting to quit smoking. At the same time, unbeknown to many, the nation was also preparing itself for the Smoke-free 2025 project. In addition, the Christchurch earthquakes happened, and both of these events affected the participants in this study although this was not known at the time.
This thesis is divided into twelve chapters. The first chapter is the introduction. It introduces the chapters that will follow and the scope of each chapter.

Chapter’s two to six consider the main literature on the variables of interest: smoking and nicotine addiction (Chapter 2), smoking cessation (Chapter 3), mood (Chapter 4) and eating (Chapter 5). The final chapter in this section examines the literature linking both mood and eating together with quitting smoking (Chapter 6). This chapter ends with an introduction to the general concept of the SCeMES.

The next three chapters (seven to nine) are the methodology section. In chapter seven, the mixed method research (MM) is introduced. This chapter includes a brief description of MM, methods to apply MMR and the many MMR designs. This chapter describes the researchers’ perspectives or positions within the research context. At the end, the MM purpose statement is also presented. Chapters eight and nine are the methods chapters for both the SCeMES quantitative study (SCeMES-QN) and the SCeMES qualitative study (SCeMES-QL). This is followed by chapters ten and eleven which are the results of both SCeMES-QN and SCeMES-QL respectively.

The final chapter (Chapter 12) include both the discussion and conclusion. This section attempts to make sense of the data and to determine whether the research objectives have been accomplished for the study.
LITERATURE REVIEW
CHAPTER 2 – Smoking

2.1 Chapter Overview

This chapter introduces the epidemic of smoking and the impact it has to individuals who smoke which include both health and non-health harms. This chapter also provides an explanation on the reasons why people smoke and the justification on why smoking is an addiction. The role of nicotine will be introduced and its role in addiction is explored. The field of tobacco control is also introduced in this chapter and what New Zealand has contributed to the field of smoking cessation.

2.2 Smoking, Nicotine Addiction and Tobacco Use Disorder

2.2.1 Epidemiology

According to the World Health Organization (WHO), there are more than one billion smokers worldwide (World Health Organization, 2011c). This number will continue to grow as the tobacco industry moves its operations to the Asia-Pacific region (Thun, Peto, Boreham, & Lopez, 2012). Smoking is the most common form of tobacco use and is the number one public health problem in the world, being likened to an “epidemic of death” (Doll, Peto, Wheatley, Gray, & Sutherland, 1994). Six million people die yearly worldwide from tobacco related deaths, and this number is estimated to reach 10 million by 2030 (Michael; Eriksen, Mackay, Schluger, Islami, & Jeffrey., 2015). For every one death, a further 20 people are affected by smoking related health problems (Centers for Disease Control and Prevention, 2003). As a consequence of this harm to health and the cost that ensues, various tobacco control initiatives have been put in place by governments worldwide. Tobacco control activities include controlling tobacco use through prevention, and assistance in the treatment of those affected by tobacco use.

2.2.2 Framework Convention on Tobacco Control

In 2004 the WHO ratified its first ever legally binding treaty: the Framework Convention on Tobacco Control (FCTC) (World Health Organization, 2003). One hundred and seventy-three countries worldwide are signatories to this document (World Health Organization, 2011c). Member countries of the FCTC are expected to play their role in reducing the prevalence of smoking in their respective countries. The FCTC, in its working document, produced a number of Articles to reach this
objective, with the core demands listed in Articles 6-17 of the document (World Health Organization, 2003). These core demands are summarised in the MPOWER measures produced by the same group, and include monitoring tobacco use and prevention policies; protecting people from tobacco smoke; offering help to people wanting to quit tobacco use; warning about the dangers of tobacco use; enforcing bans on tobacco advertising, promotion and sponsorship; and, finally, raising taxes on tobacco (World Health Organization, 2008). Using the measures of MPOWER and guided by the Articles within the FCTC document, member countries are able to standardise and improve existing policies, assist one another in tobacco control activities and apply best practice strategies. Although a number of countries are still trying to implement and enforce strategies within the FCTC, there are some, led by New Zealand, which hope to be smoke-free by 2025 and are starting to think about the end of tobacco use in their countries (Blakely et al., 2010; Thomson et al., 2012).

2.2.3 Smoking Harm

2.2.3.1 Direct Harm

The landmark study on British doctors by Doll and Hill (1956) linking smoking to lung cancer, and the influential report by the US Surgeon General (1964) comprised of studies on the many health consequences of cigarette smoking at the time, heralded the beginning of the rapid acceleration on tobacco control activities. Smoking kills half of its users when used as intended through the various toxins in tobacco (Eriksen, Mackay, & Ross, 2012). It has been found that 7000 toxins, such as butane, ammonia and others, are released during tobacco smoking, and of these, 69 have been found to be carcinogenic (Eriksen et al., 2015). The main cause of health problems starts with the ‘tar’ within the smoke as a result of smoking tobacco. The main health burden and harm associated with smoking is cancer, particularly in the lung (Eriksen et al., 2015). Smokers have been estimated to die, as much as 10 years earlier than non-smokers (Doll, Peto, Boreham, & Sutherland, 2004). There have been many other studies since, linking smoking with various other health problems. The US Surgeon General’s report (2004), for instance, highlighted substantially and conclusively evidence that smoking causes cardiovascular diseases such as myocardial infarction and atherosclerosis; respiratory diseases such as chronic obstructive pulmonary disease (COPD); and cancers, other than lung cancer, such as laryngeal and esophageal cancers. Smoking has also been linked to poorer mental health (Blakely et al., 2010), mental illnesses such as depression (Boden,
Fergusson, & Horwood, 2010), a decline in memory (Dregan, Stewart, & Gulliford, 2012), and poorer outcomes in pregnancies (Cnattingius, 2004). Those with mental illness due to their higher smoking prevalence (Lawrence et al., 2009) and cigarette consumption (Lasser et al., 2000; Tobias, Templeton, & Collings, 2008) die even earlier (Parks, Svendsen, Singer, Foti, & Mauer, 2006).

2.2.3.2 Indirect Harm
Apart from direct harm to individuals who smoke, smokers also harm those around them. When non-smokers are exposed to cigarette smoke, they are technically involuntary smokers or engaged in second-hand smoking (SHS) (U.S. Department of Health and Human Services, 2006). SHS is reported to be as dangerous as first-hand smoking and is thought to cause half as much harm to those exposed to it (U.S. Department of Health and Human Services, 2006). Of late, there are reports of third-hand smoking (THS) (Sleiman et al., 2010). In this situation the residue of cigarette smoking is left behind on everyday items such as car upholstery, house curtains and bedding, and other furniture. Once enough smoking residue is available, it can either cause health problems on its own or by ‘off-gassing’ (Dreyfuss, 2010), whereby these residues are released back in the air as gases (Sleiman et al., 2010). Both modes of action lead to cigarette smoke causing harm long after the smoker has completed smoking. Once these gases are released into the air, they can interact with other gases and continue to cause harm. For example, when nitrous oxide interacts with third-hand smoking, nitrosamines, a known carcinogen, is created (Becquemin et al., 2010; Sleiman et al., 2010).

2.2.3.3 Economic Harm
There is enough evidence to suggest that cigarette smoking has a causal relationship with adverse health outcomes, including cancer care (Health & Services, 2014). Smoking is costly to countries economically. Cancer care in the United States alone, for instance, costs USD120 billion in 2010 (Mariotto, Robin Yabroff, Shao, Feuer, & Brown, 2011). The cost in Europe, in terms of cost of medication to treat cancer, based on data from 19 selected European countries, is estimated to be 71 billion equivalent dollars (Jönsson, 2007). These costs can be expected to increase with population growth (Mariotto et al., 2011), especially with the expected increase in smoking prevalence in Asia-Pacific countries, including China and India, the two most populated nations on earth. Sadly, however, history has shown that there is a lag time of 30-40 years before tobacco related mortalities and morbidities peak (Thun
et al., 2012) and, therefore, health resources of the future will be increasingly strained. Apart from the economic cost as a result of increasing health costs, smoking also affects costs related to worker productivity. This was measured through either smoking breaks, time off work due to illness, or even early retirement due to smoking related illnesses (Allender, Balakrishnan, Scarborough, Webster, & Rayner, 2009; Bunn III, Stave, Downs, Alvir, & Dirani, 2006; Halpern, Shikiar, Rentz, & Khan, 2001; Neubauer et al., 2006). Equally important, were smoking related fires which were often not well studied (Leistikow, Martin, & Milano, 2000; Smith, Bullen, Laugesen, & Glover, 2009). It was estimated that 1% of fires worldwide and 10% of fire deaths were due to cigarette smoking (Leistikow et al., 2000). Transportation to healthcare providers; the care and cost to non-healthcare providers such as time off to care for sick family members due to smoking; cleaning cloths and air due to smoking for both personal property and corporations; business expenses for companies to replace or retrain replacement workers; and insurance premiums for both fire and accidents were also non-health related economic burdens of smoking (World Health Organization, 2011b).

2.2.4 Benefits of Smoking

Although much had been mentioned regarding the harms of smoking, there are reports of possible benefits of smoking (Barbash et al., 1995). These findings were termed the “smoker’s paradox” (Barbash et al., 1995) after Nesbitt’s P, which has been described as a pool of inter-related data which did not make sense (Parrott, 1998). Nicotine on its own has been shown to have some benefits such as assisting in weight control, normalizing irritable mood, enhancing of performance both physical (to an extent) and concentration; and improving certain health conditions, for example Parkinson’s disease and Alzheimer’s disease (Jarvik, 1991). Smoking cigarettes, however, has been found to be detrimental to human health as mentioned earlier. Despite the well documented harms of smoking, there are reports of smokers doing better compared to non-smokers. Areas where this has been reported are in acute myocardial infarct (AMI) recovery (Nakaji et al., 2003), the low development of colorectal cancers (Terry & Neugut, 1998) and in reducing pre-eclampsia incidences (Cnattingius, Mills, Yuen, Eriksson, & Salonen, 1997). These reports, however, have since been invalidated, as more recent evidence has suggested that there might be confounders, such as age, to explain the apparently positive effects of smoking (Dahabreh & Kent, 2011; A. C. Parrott, 1998). In one particular explanation for the
findings of an apparent positive outcome, for the lower mortality amongst AMI patients who were smokers versus non-smokers, it was found that smokers tended to develop AMI at a young age and therefore were more favourable towards treatment, which might have explained the more positive outcomes (Aune, Røislien, Mathisen, Thelle, & Otterstad, 2011). In conclusion, although there are reports suggesting that smoking might have some benefits in certain conditions, current evidence suggests the harms far outweighs any potential benefit to health (Health & Services, 2014).

2.2.5 Benefits of Quitting

2.2.5.1 Health Benefits
Quitting smoking undisputedly has many benefits. Although smoking is directly associated with many illnesses, some of these conditions are reversible, such as Crohn’s disease and coronary heart disease, where the risk to a smoker, after quitting smoking for one year and fifteen years respectively, is equal to a non-smoker (Fagerstrom, 2002). Taylor et al. (2002), in their analysis on data from the Cancer Prevention Study II in the US involving 1.2 million participants, reported that the earlier one quits smoking, the greater the benefits to health. Quitting before the age of 35 years improved life by an additional 7-8 years. Health gains were also noted at any time point on quitting. Short-term health benefits were noted in respiratory and cardiovascular improvements. Respiratory symptoms improved by 5% within a few months and this improvement was cumulative. For those with cardiovascular disease, a 50% risk reduction was observed after only one year of abstinence, and the risk for cardiovascular diseases became similar to non-smokers after 15 years of being abstinent. Cancer risk, however, never dropped to the level of non-smokers, though it was lowered.

The benefit of lower death related to any cancer occurs as early as five years of abstinence (Kenfield, Stampfer, Rosner, & Colditz, 2008). Even for those with early diagnosis of lung cancer, quitting reduces mortality and recurrence compared with continued smokers (Parsons, Daley, Begh, & Aveyard, 2010). Other health benefits include an improvement in quality of life (Anthonisen et al., 2005; Mulder, Tijhuis, Smit, & Kromhout, 2001).

2.2.5.2 Economic Benefits
There is clear evidence that there are long-term economic benefits in quitting smoking as a result of improved health, and fewer smoking related complications in
the future. The short-term economic benefits of quitting smoking, however, can be more difficult to measure (Menzin, Lines, & Marton, 2009). One example of a short-term benefit is work absenteeism. Studies examining smoking cessation and work productivity have shown that the cost of loss of productivity is similar for those who no longer smoke, as early as four years post-quitting, to non-smokers (Halpern et al., 2001). Therefore, employers that encourage their workers to quit smoking will be able to gain cost benefits in the short term as a result of better work productivity.

Apart from public health interventions mentioned earlier, the use of current available smoking cessation treatments overall have been shown to be cost effective compared to smokers quitting on their own (West et al., 2015). Studies examining the cost benefits of various treatments have also been positive (Howard, Knight, Boler, & Baker, 2008; Menzin et al., 2009; Song et al., 2002) with the latest treatment available, varenicline, predicted to surpass all the present treatments available (Howard et al., 2008). To conclude, quitting smoking is clearly beneficial both economically and for health.

2.3 Smoking as an Addiction

There has been considerable debate on whether smoking is an addiction or a habit, however, this was put to rest with the publication of the Surgeon General Report (Health & Services, 2014). Since then, there has been much research on the mechanism of addiction and its role in smoking. As explained in later sections of this chapter, nicotine is implicated as the main chemical of addiction leading to the maladaptive and repeated use of smoking, apart from the challenges to quit as a result of withdrawals (Henningfield, 2000). People who smoke were found to develop characteristics of addiction such as salient behaviour, dyscontrol, compulsive use and finally physiological changes (Sellman, 2007). Moreover, the availability and lack of restrictions on its use together with an industry that markets smoking to be desirable, increases its addictive potential through psychological processes, all of which will be elaborated further below.

2.3.1 Tobacco Use as a Disorder

The use of tobacco was first considered a disorder with its introduction into the International Classification for Disease (ICD). The ICD is used to code and classify both morbidity and mortality data. The notion that smokers can have problems with their tobacco use was included in the ninth edition of the ICD as tobacco use disorder
(Slee, 1978). The Diagnostic and Statistical Manual (DSM), a manual that classifies and describes mental disorders, classified the same problem in its third edition (1980) as tobacco dependence (American Psychiatric Association, 1980). This was subsequently changed to nicotine dependence in the revised version in 1987 (Sees, 1990). Both the ICD tenth edition and the DSM fourth edition use nicotine dependence as its terminology (American Psychiatric Association, 2000; World Health Organization, 1993). Both of these major classification systems described this disorder as an addiction; with characteristic symptoms of tolerance, withdrawal and salience. In 2013, the DSM-IV-TR was replaced with the DSM 5 which saw the introduction of nicotine use disorder as the diagnosis to denote an addiction to tobacco. For the DSM 5, the item ‘craving’ was reintroduced as a criterion for diagnosis, which is an essential feature in the understanding of nicotine dependence (Shmulewitz et al., 2013) and therefore much welcomed within the field.

### 2.3.2 The Role of Nicotine

Cigarette smoking is the most common form of tobacco ingestion worldwide (Eriksen et al., 2015). Although tobacco contains a number of toxins, it is the nicot ine within tobacco which is the main driver (positive reinforcement agent) for this addiction. Nicotine is rapidly absorbed by the lungs through smoking and reaches the brain as quickly as ten seconds post inhalation (Henningfield, 1995). The addictive properties of nicotine are thought to be related to the release of dopamine in the anterior midbrain when binding to nicotinic acetylcholine receptors (nAchR), particularly the α4β2 nAchR. The dopamine released then binds to receptors in the meso-limbic dopaminergic neuron system, thus signalling salience and pleasure. As nicotine is rapidly broken down, the effects are short. Unlike other receptors, which often down-regulate when there is an increase in external substrate such as nicotine, in the case of smoking, the nAchR up-regulates in response to external nicotine ingestion (Wonnacott, 1990). As a result, more nicotine is required to produce the same positive effect when smoking, and in order to achieve this more cigarettes are needed. This phenomenon also illustrates how tolerance develops due to smoking. Subsequently, a lack of nicotine causes withdrawal symptoms to be experienced on smoking cessation (Laviolette & Van Der Kooy, 2004). In explaining addiction, O’Loughlin et al.,(2009) argued that one can possibly be addicted to nicotine from the first cigarette within 3 months, whereas Scragg, Wellman, Laugesen, and DiFranza (2008), found this to be true as early as 1 month. Russell (1990), on the other hand
reported that three to four cigarettes are required to result in dependence. All three studies were conducted among children (ages between 10-13) using self-reported smoking status and levels of dependence using different questionnaires. What exactly constitutes “addiction” is not yet precisely defined neurophysiologically due to the manner in which tobacco is ingested, i.e. smoked. Its availability and the possibility to ingest multiple and frequent doses to the brain might influence its level of addictiveness. This has led some to describe tobacco use to be as addictive as heroin, cocaine or amphetamines (Stolerman & Jarvis, 1995). When paired with other pleasurable activities, such as eating and drinking alcohol, addiction is consolidated and therefore becomes even more difficult to give up. Advanced, real time imaging, using positron emission tomography (PET) has been able to show higher dopamine levels in living tissues in those addicted to nicotine, similar to those using drugs such as amphetamine or cocaine. The mechanism of action, however, may be different (Gerasimov, 2000; Volkow, Fowler, & Wang, 1999).

2.3.3 The Role of Genetics

Genetics play an important role in the aetiology of nicotine addiction. Numerous studies using twin, adoption and other methods have found the role of genetics in nicotine dependence to be between 30-70% (Agrawal et al., 2012; Hall, 2005; Hall, Madden, & Lynskey, 2002; Li, 2006). Therefore, addiction is not merely a passive physiological process, but rather a complex and multifaceted condition (Gifford & Humphreys, 2007; Koob et al., 2013). In genetic research, researchers have identified candidate genes for nicotine dependence (Agrawal et al., 2012), the most robust being the chromosome 15 variant candidate gene (Agrawal et al., 2012). However, it is still thought that multiple genes interact collectively to produce a vulnerability to nicotine addiction in any one individual (Hall, 2005).

2.3.4 The Role of Psychology

An understanding of the natural history of smoking might allow an understanding of the psychosocial factors in smoking. Lichtenstein (1982), summarised the natural history as having four stages: initiation, maintenance, cessation and resumption/relapse. In his summary, the author emphasised the role of psychosocial factors as critical in initiating and stopping smoking. The initiation of smoking, although influenced by genetics, is largely a psychosocial process, an idea supported by social learning theory, especially expectancy, self-efficacy, coping and craving (Brandon,
Using this model, the authors argued that the expectation that the drug produces ‘pleasurable experiences’ has positive effects to initiate consumption. Both positive and negative reinforcement models (Eissenberg, 2004; Glautier, 2004; Tiffany, Conklin, Shiffman, & Clayton, 2004) maintain addiction by frequent nicotine use producing both pleasurable experiences on consumption and negative withdrawal symptoms on stopping. This process is strengthened through an unconscious learning process involving cognitive processing and neurobiological changes (Gifford & Humphreys, 2007; Laviolette & Van Der Kooy, 2004; Tiffany et al., 2004).

2.3.5 Nicotine Withdrawal
Withdrawal symptoms are symptoms which manifest on ceasing the use of an addictive agent once neuroadaptation has occurred. According to the DSM, nicotine withdrawal symptoms include irritability, anxiety, problems concentrating, restlessness, decreased heart rate, increased appetite or weight gain, dysphoric mood, and difficulty in sleeping, which might occur following cessation after twelve months or more of use. These symptoms are associated with daily use of nicotine and are relieved or avoided by retaking nicotine (American Psychiatric Association, 2000). These symptoms are also similar to those described in the ICD (World Health Organization, 1993).

Most withdrawal symptoms last for a short period of time, whilst others might last longer and cause further complications such as a mood disorder or excessive weight gain (Ministry of Health, 2007). Current smoking cessation guidelines include suggestions to manage these complications, as many who attempt to quit smoking report being concerned about their mood changes and weight gain. Yet, some of these withdrawal symptoms, such as constipation and respiratory tract infection among others, have not been fully studied to date (Ministry of Health, 2007; West, Ussher, Evans, & Rashid, 2006).

2.4 Psychiatry and Smoking
Although addiction and its management are within the field of psychiatry, nicotine addiction has received little attention. Those with mental illness are two to three times more likely to smoke than those without (Lawrence et al., 2009; Ziedonis et al., 2008). Conditions such as schizophrenia are associated with a smoking prevalence of up to 85% (Prochaska, Hall, & Bero, 2008; Ziedonis et al., 2008). Those with
schizophrenia also smoke heavily (defined as smoking more than 25 cigarettes per day) (Lasser et al., 2000; Ziedonis, Williams, & Smelson, 2003), have higher dependence or severity scores compared to the general public (Lohr & Flynn, 1992), and have also been found to be more “efficient smokers,” able to extract and absorb more nicotine from each cigarette puff (Olincy, Young, & Freedman, 1997). People with mental illness constitute 16% of the New Zealand population (Ministry of Health, 2012), but smoke 33% of the cigarettes consumed in the country (Tobias et al., 2008). In the United States, 44% to 58% (Grant, Hasin, Chou, Stinson, & Dawson, 2004; Lasser et al., 2000) of all cigarette sold, are consumed by the estimated 25% of the population who have a mental illness (Center for Disease Control and Prevention, 2013).

Although smoking is highly prevalent and the consequences very debilitating, psychiatry has generally neglected nicotine dependence and its relationship with people with mental illness (Moss et al., 2010). It is common for people with mental illness to be excluded from smoking cessation trials, and often excluded from quit smoking initiatives altogether (Hall, 2007; Hall & Prochaska, 2009). Some professionals refer to this group as the “underserved” population (Borrelli, 2010), together with other groups, such as the low-socioeconomic population. The underserved often report a higher prevalence of smoking compared to the general population, and more difficulties in quitting smoking (Borrelli, 2010).

Tobacco use and its treatment are underemphasised in psychiatry. One obvious example is the slowness to establish smoke-free inpatient services. Despite many countries having environmental or similar laws to prevent smoking in closed buildings such as hospitals (Malone & Warner, 2012), not all inpatient psychiatric facilities are smoke-free (Lawn, 2007). Those in psychiatry also need to be better equipped with tobacco control strategies as recommended by the FCTC (such as increasing taxes and expansion of smoke free areas for example), (World Health Organization, 2003) to better protect the health of people with mental health who smoke. Moreover, quitting smoking improves mental health rather than worsen it (Taylor et al., 2014), contrary to what those in mental health think (Prochaska, 2011). In Christchurch, New Zealand, it has taken half a decade longer for all mental health services to be smoke-free, achieving this in 2010, compared to all other health services within the New Zealand public hospitals, which have been smoke-free since 2004 (Canterbury District Health Board, 2010; Ministry of Health, 2003).
2.4.1 Psychiatrists and Tobacco Control

Psychiatrists, although able to provide smoking cessation towards patients under their care who smoke have only recently begun to consider their possible contributions (Moss et al., 2010). A review of the literature identified a number of perceived barriers to action which include failure to inculcate interest to conduct smoking cessation among psychiatrists at the outset of their training, the lack of interested supporting staff, and/or the unavailability of appropriate infrastructure (Amer Siddiq et al., 2015). This review concluded that psychiatrists need to put tobacco dependence on par with other mental illnesses that they treat daily and also keep updated with the latest treatment modalities available so as to better equip themselves to provide assistance to their patients when opportunities arises.

2.5 New Zealand and Tobacco Control

2.5.1 New Zealand Smoking Developments

New Zealand has made a lot of progress in terms of tobacco control in recent decades, both within the country and globally. The history of this progress has been previously documented (Cancer Council New Zealand, 2008; George & Nicholas, 1997). However, this section will briefly describe what has been done in the past, before describing current developments happening in New Zealand.

Prior to the 1960s, tobacco control activity in New Zealand was almost non-existent. As scientific evidence on the harm of smoking emerged from the 1960s through the early 1980s, tobacco control activities started to take shape and have continued to evolve since. The increase in scientific evidence on the harm that smoking has on health, most likely affected the medical physician population at the time, as smoking prevalence amongst physicians was reported to be as high as 39.3% in 1963, but had reduced to 20% by 1976 (Cancer Council New Zealand, 2008). In 2012, this number was reported to be less than 5% (Edwards et al., 2012). In 1976, as a result of the awareness of the dangers of smoking, the health census included smoking status, probably the first time in the world that this information was captured in a national census. Since then, a number of initiatives were implemented until the early 1990s, leading to a drop in the national smoking prevalence from 32% in 1984 (which had been > 30% since the 1970s) to 27% within a five year period.
The emerging evidence and awareness of the dangers of tobacco smoking, especially in public, was a significant factor in the success towards implementing the Smoke-Free Environment Act (SFE) 1990 in New Zealand. This Act was further amended to support more initiatives such as increasing the purchasing age from 16 to 18 years of age (SFE 1999), smoke-free restaurants and bars (SFE 2003) and; the point-of-sale bans (POS) (SFE 2012) (Cancer Council New Zealand, 2008; Māori Affairs Select Committee, 2010). Also in the 1990s, two other leading developments occurred: the introduction of the first clinical guideline to manage tobacco dependence, and the establishment of the Quitline service. These two initiatives foreshadowed the beginning of cessation activities in New Zealand. Most of the previous activities were preventive in nature. The combination of both arms of tobacco control in New Zealand, both prevention and cessation activities, pushed the tobacco agenda forward further in the country. Aukati Kai Paipa, a smoking cessation initiative for Māori was also introduced during this period. Māori, unfortunately, had been over-represented in the New Zealand smoking epidemic and were reported as having serious health outcomes as a consequence (Stevens, Stevens, Kolbe, & Cox, 2008). Similar information and concerns were precursors for the eventual Māori Affairs Select Committee (MASC) report (Blakely et al., 2010).

The last 20 years have seen a greater shift in public opinion towards tobacco control issues in New Zealand. This shift has allowed for more support and is probably a major reason for successful regular SFC amendments to reduce the prevalence of smoking even further, despite opposition from business owners and other relevant stakeholders with interest (Edwards, Wilson, Thomson, Weerasekera, & Blakely, 2009). This unwavering support has also allowed for further tax increases on tobacco from the early 2000s which are still on-going. The latest strategy for tax increases includes a progressive increase of 10% yearly for a three year period and reassessed every three years, as opposed to a yearly increase (Wilson & Thomson, 2005; Wilson et al., 2010). A three-yearly incremental increase allows the tax raise agenda in MPOWER to be included consistently, as a means to further reduce smoking prevalence. The scientific evidence of health inequalities due to smoking has also led to the push of the MASC report, which has called for a Smoke-free New Zealand by 2025 (Smoke-free 2025) through objectives such as protecting children from tobacco exposure and marketing, reducing supply and demand of tobacco products and, finally, increasing quit attempts through successful evidence based treatments (Māori Affairs Select Committee, 2010). The MASC report
recommendation was the first report on smoking adopted by an elected government, and solidified New Zealand’s reputation as leader in tobacco control innovations and initiatives.

The MASC report allowed tobacco control activities to increase in pace. Two of the immediate outcome measures were to halve smoking prevalence by 2015, and to aim for less than 5% prevalence by 2025 (Blakely et al., 2010). Since the implementation of the MASC report, increased tobacco control activities have shown progress, with the national smoking prevalence at 18% in 2012 (Ministry of Health, 2012), the first drop below 20% for over two decades. The latest prevalence is 17%, five years after implementing the MASC report (Ministry of Health, 2015). Through the MASC report also, the government has committed to follow Australia towards plain packaging, together with the UK and Scotland (Beaglehole & Bonita, 2015; Canadian Cancer Society, 2015).

### 2.5.2 New Zealand Smoking Cessation Services

Smoking cessation service provision has been slowly increasing in pace over the past decade (Ministry of Health, 2004). It has, however, had an added boost since the MASC Report was published (Blakely et al., 2010). Various smoking cessation initiatives have since been introduced, provided by a variety of health professionals. Service provision has been comprehensive and has included both the community based services through the primary health organizations (PHO), and hospital based services through the District Health Boards (DHB). Culturally appropriate services have also been developed to ensure inclusion of specific groups such as Māori and Pacific people. Furthermore, innovations such as services by the Quit Group, which include the national Quitline have also been made available, and this has included internet assisted programs to quit (Health Promotion Agency; Ministry of Health, 2004; Smokefree Coalition, 2010). The variety of services have ensured that all levels of intensity and a wide sector of the population are being catered for. Multiple avenues and opportunities to access treatment have ensured that services have been utilised well. Pharmacological treatments such as NRTs have also been subsidised to reduce barriers in accessing these services, and therefore have enabled those in the low socioeconomic groups to seek and receive treatment (Smokefree Coalition, 2010).
To support and ensure quality service is provided, appropriate training has been warranted for all healthcare providers. The government has published the New Zealand smoking cessation guidelines, aimed at safeguarding training, and at ensuring treatment for smoking cessation is of a high standard (Ministry of Health, 2007). This national guideline has been updated regularly since its inception in 1997, 2001 and 2007. It has recently been updated a fourth time, whereby additional studies since 2007 have been reviewed and an added brochure developed to complement the current existing guidelines published in 2007 (Ministry of Health, 2014). The New Zealand guidelines are also amongst the three more popular guidelines used by other countries as a major reference on which to model their respective guidelines (Piné-Abata et al., 2013). To ensure sustained awareness to treat smokers or referrals to available local services, future medical doctors and other health providers such as nurses and pharmacist have been provided training in smoking cessation during their medical school or equivalent studies (Ministry of Health, 2004). In addition, for those who have missed out or have required re-training, there are local non-governmental organizations, such as the New Zealand Heart Foundation, which have provided regular training for smoking cessation to all interested healthcare providers (Heart Foundation, 2013). In response to the MASC report, two leading research groups (Turanga and ASPIRE2025) have been formed, thus strengthening and ensuring further that the country meets its target for a smoke free 2025 through innovations in smoking cessation (ASPIRE2025, 2013; Tobacco Control Research Turanga, 2010).

Although there have been a number of achievements in tobacco control public policy in New Zealand, there are still areas for improvement (Blakely et al., 2010; Ministry of Health, 2004; Smokefree Coalition, 2010). This includes providing more options for treatment, both behavioural and pharmacological. At present, only the NRT gum, lozenges and patches are subsidized (Health Promotion Agency, 2013; Ministry of Health, 2007). Varenicline is subsidized only if the client has shown failure with two previous NRT treatments (Pharmaceutical Management Agency, 2010). There has also been a need to ensure services can be accessed by the hard to reach groups, who often have the highest levels of addiction to smoking. These include those with mental illness, those from low socioeconomic status, and minority populations such as Māori and Pacific people (Borrelli, 2010). Monitoring service usage and acceptability is also an area that needs more research.
2.6 Summary

Tobacco smoking is a public health problem with grave consequences to health. Nicotine is a highly addictive substance which can result in dependence. It is a complex addiction process which is still not fully understood neurophysiologically. Although the benefits of quitting are undeniable, the consequences of quitting, such as mood and weight changes, are important sequelae to be aware of.

The dangers of tobacco smoking and tobacco control measures have centred towards the general population, and accordingly the results of these measures are starting to be noticed with a drop in smoking prevalence. Nonetheless, in countries with mature tobacco control measures, there is an observed plateauing in smoking prevalence reduction, despite the many tobacco control activities implemented.

The ‘underserved’ population, including those with mental illness, are often reported to have high smoking prevalence but have received minimal input till recently. Psychiatry and psychiatrists have been slow to respond to address the situation in their patients. As a result, tobacco control measures for those with mental illness have been disproportionate, and at times underequipped in terms of resources. The Smoking Cessation, Mood and Eating Study (SCeMES) attempts to add to the smoking cessation discussion in New Zealand in light of Smoke-free 2025.
CHAPTER 3 - Literature Review: Smoking Cessation

3.1 Chapter Overview

This chapter attempts to provide an overview about the concept of smoking cessation and the many components of this activity. The term cessation in this chapter will take a more narrow view by emphasising cessation in the context of treatment rather than public health policy based approach to smoking cessation such as increased in cigarette process through taxation or rising the smoking age. The predictors of stopping smoking will be listed and how it affects a quit smoking attempt. The methods to quit smoking will also be highlighted in this chapter and an exploration of this will be undertaken from the perspective of the user and the provider. Finally, this chapter will end with thoughts on the barriers and challenges in providing a successful smoking cessation service.

3.2 Definition and Overview

The term ‘smoking cessation’ has been used interchangeably with ‘tobacco dependence treatment’ and is generally understood to mean the discontinuation of tobacco use. In the past, there have been efforts to remove cessation as a terminology and continue with tobacco dependence treatment as the main term to denote this. However, this process requires time, as professionals within the field need to agree on the need for a common language (Wolff, Hughes, & Woods, 2013). A search using ‘smoking cessation’ and ‘tobacco dependence treatment’ as trunk words on Medline found more than 16,155 versus 203 hits (February 2016) to illustrate this conundrum. Wolff et al. (2013) explained that ‘tobacco dependence treatment’ should be the terminology of choice as the word treatment leads to the assumption that nicotine dependence: 1) is an addiction and 2) requires assistance using the many evidence based treatments now available. Cessation, on the other hand, connotes the traditional idea that nicotine dependence is an issue regarding habit or personality (weak-willed) and that one can simply cease to be a smoker. Although in agreement with Wolff et al. (2013) for this thesis, ‘smoking cessation’ will be the choice term used throughout, as it is the most prevalent terminology used in the literature, including for the local guidelines (Ministry of Health, 2007), but it does have limitations when discussing a contemporary addiction and nicotine dependence.
Schwartz (1992) described smoking cessation to consist of three main phases: preparation, intervention and maintenance. In the stage of preparation, the smoker makes arrangements to quit smoking. Smokers who present for treatment are often motivated, but can be ambivalent about their attempt to quit, described by Prochaska and DiClemente (1983) as being in the pre-contemplative/contemplative stages of change. Motivational interviewing has been reported to assist increasing motivation to quit smoking in this stage of change (Miller & Rollnick, 2002). Increasing self-esteem and confidence to quit is also helpful during the preparation stage. The second phase includes any form of intervention which is evidence based and assists the smoker to quit. Finally, in the maintenance stage, strategies to stay abstinent, such as psychologically-based relapse prevention (Marlatt & Donovan, 2005) or long term pharmacological treatments, were included. A survey in countries with smoking cessation guidelines reported these three stages in their respective programs. What often differed between guideline implementation was the available local resources in addition to individual country income (Piné-Abata et al., 2013).

Smoking cessation programs, although effective, are different depending on whether they are public health based or clinical based (Tobacco Use and Dependence Guideline Panel, 2008). The former uses a population based approach and include smoking cessation programs such as Quitline (World Health Organization, 2011a), where smokers can call into a local number to receive assistance to quit smoking, whereas clinical based smoking cessation programs are conducted face-to-face in a clinic setting (Niaura & Abrams, 2002). The services mostly differ in the level of intensity, duration and the target population for the respective services (Niaura & Abrams, 2002). These differences might be noticed during the stage of preparation described by Schwartz (1992) earlier. Population based programs might have fewer ‘contact hours’ during the intervention stage whereas clinical based programs might have more. Conversely, public health based programs might instead have more resources used for the preparation stage (Niaura & Abrams, 2002; Tobacco Use and Dependence Guideline Panel, 2008). Despite this, both types of programs have been found to be equally effective and their effectiveness has been studied on their own, separately or together (Niaura & Abrams, 2002). There are also studies which combine the two forms of programs with newer interventions such as, for example, internet based treatments or text-messaging to assist smokers to quit (Boal, Abroms, Simmens, Graham, & Carpenter, 2016; Niaura & Abrams, 2002; Torres et al., 2010).
Smoking cessation programs have also led to the development of dedicated practitioners to either initiate, co-ordinate or even manage these respective programmes (Hughes, 2007). These practitioners are known as tobacco treatment specialists (TTS) or, in some countries such as New Zealand, smoking cessation specialists (Berlin, 2009; Heart Foundation, 2013; Hughes, 2007; Pbert, Ockene, Ewy, Leicher, & Warner, 2000; Wolff et al., 2013). These TTS are practitioners who are referred to as having an extensive knowledge in the field, are often accredited or licensed and able to handle a wide variety of clients (Berlin, 2009; Hughes, 2007; Pbert et al., 2000). This includes difficult to treat smokers such as those with mental illness, pregnant mothers and those with medical co-morbidities such as cancers, cardiovascular diseases and others (Hughes, 2007; Wolff et al., 2013). TTS often receive more training compared to general smoking cessation providers and are often used as a source of reference (Berlin, 2009; Hughes, 2007; Pbert et al., 2000).

### 3.3 Predictors for smoking cessation

This section describes common predictors for cessation grouped into general demographic predictors, tobacco related predictors, psycho-social predictors and treatment. Depression predictors will be covered later in section 4.5.4.

#### Table 3.1 Predictors for Smoking Cessation

<table>
<thead>
<tr>
<th>Items</th>
<th>Predictors in outcomes for smoking cessation</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Early age of initiation</td>
</tr>
<tr>
<td></td>
<td>No gender difference</td>
</tr>
<tr>
<td></td>
<td>Lower socioeconomic background</td>
</tr>
<tr>
<td>Tobacco Related</td>
<td>Increase levels of addiction</td>
</tr>
<tr>
<td></td>
<td>Presence of craving</td>
</tr>
<tr>
<td></td>
<td>History of quit attempts</td>
</tr>
<tr>
<td></td>
<td>Perceived reaction to withdrawal symptoms</td>
</tr>
<tr>
<td>Psychosocial</td>
<td>Motivation levels</td>
</tr>
<tr>
<td></td>
<td>Presence of stress</td>
</tr>
<tr>
<td></td>
<td>Cultural beliefs</td>
</tr>
<tr>
<td>Treatment</td>
<td>Follow-up attendance</td>
</tr>
</tbody>
</table>

#### 3.3.1 General Predictors

The most commonly referred to predictors are age of initiation, gender and socio-economic status. Early age of initiation has been associated with poorer outcomes of treatment (Naomi Breslau, Fenn, & Peterson, 1993; Khuder, Dayal, & Mutgi, 1999).
In a study involving 1007 young adults, those who started smoking early were associated with a poorer outcome. In those who smoked after the age of 13, the success rate was significantly higher. Amongst those who started between the ages of 14-16 years old, the smoking cessation success was 1.6 times higher compared to those 13 years and younger. For those who started smoking after the age of 17, the rate of success was found to be doubled (Naomi Breslau & Peterson, 1996). In another study involving 1282 adult participants in a smoking cessation program, those who started earlier than 17 years were 1.5 times more likely to smoke compared to older participants (Iliceto, Fino, Pasquariello, D'Angelo Di Paola, & Enea, 2013). A study of nearly 10,000 participants of Asian origin found similar findings to those of Breslau and Peterson (1996) and Iliceto et al. (2013), where those who started smoking early (<20 years) were associated with difficulties in quitting (Honjo, Iso, Inoue, & Tsugane, 2010). An explanation for this finding includes a dose response situation. An early start to smoking could lead to greater addiction and also to an increase in cigarette use (Fergusson, Goodwin, & Horwood, 2003). Early initiators likewise were found to be at increased risk of chronic exposure of nicotine to the brain, which might lead to greater consolidation (Benwell, Balfour, & Anderson, 1988). The increasing addiction, greater cigarette consumption, chronic changes and subsequent consolidation may then affect successful smoking cessation.

Hitsman, Borrelli, McChargue, Spring, and Niaura (2003) did not find any association between gender and smoking cessation, while Gierisch (2012) reported too small a sample for further analysis. Puente et al. (2011), in a one year study of participants attending smoking cessation in primary health care centres, also found no association between genders. Iliceto et al. (2013), however, reported that men tended to do better in smoking cessation studies, whilst women on the other hand were reported to have 1.5 times the risk of relapsing. Possible explanations for this difference included the higher rates of depression (Kessler & Bromet, 2013) and greater concerns with weight gain (Larsen et al., 2009) amongst women, both of which could increase relapse. Nonetheless, overall the studies reviewed did not favour any difference in successful quitting between genders.

Those from low socioeconomic background were reported to have a higher prevalence of smoking and also lower successful quit rates (Hiscock, Bauld, Amos, Fidler, & Munafò, 2012). This population was also often less studied, as were
populations of those with depression and other mental illnesses (Borrelli, 2010). The International Tobacco Control (ITC) Four Country Survey found social inequalities at many stages of the quit attempt (Reid et al., 2010). This study involving four high income countries (HIC) – Canada, United States, United Kingdom and Australia - found that smokers with more income were more likely to want to attempt smoking cessation and were also more likely to be abstinent for at least a month compared to those with lesser income. Siahpush, Yong, Borland, Reid, and Hammond (2009), also found in their ITC study that smokers with financial difficulties wanted to quit, but were often less successful compared to those without similar difficulties, OR 0.53 CI (0.33-0.87). A Canadian longitudinal study of more than 8,000 respondents also found a strong association between poverty and reduced smoking cessation uptake. This scenario was noted to improve when those studied were able to remain out of poverty (Young-Hoon, 2012). One of the reasons why those from low socioeconomic status had poorer smoking cessation outcomes was the inability to sustain treatment cost (Aguiar et al., 2009; Siahpush et al., 2009). Poverty appears to be negatively associated with successful quitting in most studies reviewed.

3.3.2 Tobacco Related Predictors

Smoking is an addiction (refer to 2.3). The greater the addiction to nicotine, the more difficult it is to quit smoking. This has been reported through various measurements of addictiveness to nicotine or cigarettes. Using the Fagerstrom Test for Cigarette Dependence (FTND), Breslau and Johnson (2000), reported a four-fold increase in difficulty to quit in those highly dependent on tobacco compared to those with low dependence. Increased cigarette use was also associated with lower likelihood of cessation (Hagimoto, Nakamura, Morita, Masui, & Oshima, 2009). Objective measurements implying greater dependence (salivary cotinine as a nicotine breakdown measure) (Powell, 2010) and carbon monoxide screening (a measure of tobacco smoke by-product) were also related to poorer outcome (Wee, West, Bulgiba, & Shahab, 2011).

Craving for tobacco, often reported as a psychological withdrawal symptom can also affect a quit attempt (Franken, 2003). In a study of 2600 smokers, craving was associated with increased relapse rate compared to those reporting lower craving scores (32% vs.15%) (Killen & Fortmann, 1997). In another study of unaided quitters, men who identified with smoking to reduce craving were at greater risk for relapse at one year. This study was, however, limited by sample size and their use of unverified
quitters (Nakajima & al'Absi, 2012). Nevertheless, the presence of craving appears to influence smoking cessation negatively.

Previous history of quit attempts were also found to be important (Hymowitz et al., 1997). A systematic review using data from 17 studies reported that the number of previous quit attempts was highly predictive of another quit attempt (Vangeli, Stapleton, Smit, Borland, & West, 2011) and the more attempts made the greater the likelihood of success. A quit attempt lasting more than 5 days was also reported to be helpful in increasing successful quitting (Caponnetto & Polosa, 2008).

Perceived reaction towards withdrawal symptoms was also found to affect success in smoking cessation. Smokers who perceived more difficult withdrawal symptoms were less successful compared to those without similar perceptions (Weinberger, Krishnan-Sarin, Mazure, & McKee, 2008). Smokers who related having a higher positive perceived cigarette benefit were also found to have poorer smoking cessation outcomes (Friedman-Wheeler, Ahrens, Haaga, McIntosh, & Thorndike, 2007; Schleicher et al., 2009).

In summary, a greater level of addiction to tobacco, the presence of craving and increased perception of withdrawal symptoms on quitting were associated with unsuccessful quitting. The more smoking quit attempts attempted, on the other hand, was found to be associated with better outcomes.

### 3.3.3 Psychosocial Predictors

Adapting motivational interviewing to smoking cessation is useful, as greater motivation to quit has been found to increase successful quitting (Caponnetto & Polosa, 2008; Wee, West, et al., 2011). Self-efficacy, which is related to motivation, has also been reported to influence smoking cessation outcomes. Those with reduced self-efficacy are less successful compared to those with increased self-efficacy. However, the findings are less robust than initially thought as many of the studies included overestimated the relationship with little consideration to control relevant confounding factors such as smoking behaviour (Gwaltney, Metrik, Kahler, & Shiffman, 2009).

Smoking is believed to reduce stress (Nakajima & al'Absi, 2012), while the opposite has been reported by others (Leung, Gartner, Dobson, Lucke, & Hall, 2011). There are many relationships between stress and smoking in particular; stress and coping,
self-medication and the role of the HPA axis involvement (Kassel, Stroud, & Paronis, 2003). A number of studies have found that stress, even perceived stress, was a factor in predicting smoking cessation outcomes with increasing stress, often leading to poorer outcomes (Buczek, Le, Wang, Stewart, & Shaham, 1999; McKee et al., 2011; Park et al., 2009; Tsourtos et al., 2011). In their study investigating major depression and progression to nicotine dependence, Khaled, Bulloch, Williams, Lavorato, and Patten (2011), found that those who had a poor coping style often coped by smoking to reduce stress and to have a shorter time to first cigarette (an indicator of addiction to cigarettes), independent of the other predictors studied. Therefore, increasing stress with poor coping was associated with increased risk to first cigarettes and subsequent lapse or relapse in a quit attempt. Properties within tobacco, particularly nicotine, can enhance concentration and attention and might be implicated in assisting with stress; however, increase in stress might also lead to greater risk of relapse (Kassel et al., 2003; Prochaska, 2011). The relationship between stress, the HPA axis involvement and smoking cessation is more complex. Smoking produces the same physiological changes as a stressful event i.e. increase in heart rate, and heightened sense of arousal. However, clinically, smokers report a calming effect, often reported as the paradoxical effect of smoking (Parrott, 1994). An increase in stress results in individuals relapsing, based on the calming effects experienced, despite physiological changes showing otherwise (Kassel et al., 2003).

There is a growing call to include cultural and contextual circumstances when proposing psychosocial interventions (Bernal & Sáez-Santiago, 2006). Similarly, awareness of cultural beliefs may also play a role in successful quitting. The lack of awareness of certain cultures or superstitions may render current western based smoking cessation strategies to be ineffective when applied to a multicultural setting. One study investigating this idea included 140 African Americans, a group with greater tobacco complications, and found that the participants who had acculturated with the western values appeared to do better compared to those who had not (Hooper, Baker, de Ybarra, McNutt, & Ahluwalia, 2012). Many other researchers, though, used similar western based smoking cessation programs within their community and found no difference in the ease of use and effectiveness of these type of programs (Honjo et al., 2010; Tsai, Lin, & Tsai, 2012; Wee, West, et al., 2011) compared to the findings of Hooper et al. (2012).
To summarise, the role of stress and coping was a greater predictor compared to culture as a psychosocial cause to smoking cessation outcome.

3.3.4 Treatment Predictors

Apart from the recommendation of aided versus unaided smoking cessation attempts, number and duration of treatment have been shown to be predictors of successful outcomes. Most guidelines recommend at least four or more follow-up sessions (Ministry of Health, 2007). The Tobacco Use and Dependence Guideline Panel (Tobacco Use and Dependence Guideline Panel, 2008) found no added advantage of more than eight follow-up sessions compared to 4-8 [OR 2.3, CI (2.1-3) vs. OR 1.9, CI (1.6-2.2)]. However, more sessions with longer durations might be needed for those who meet criteria for hardened smokers: those who are older, those who have smoked a greater number of cigarettes, have had a longer history of smoking, and have had more frequent unsuccessful smoking cessation attempts (Samokhvalov et al., 2013; Warner & Burns, 2003). More intensive sessions often require longer duration of contact time which might be achieved through multiple follow-up visits. Those who are living with other smokers, are less educated and come from a lower socioeconomic status are also at greater risk of relapse and therefore require more follow-up compared to smokers from the general population in their smoking cessation requirements (Samokhvalov et al., 2013). These increased visits are found to be equally more effective for both the general group and those with special needs in quitting smoking (Iliceto et al., 2013).

3.4 Usefulness of Smoking Cessation Programs

Smoking cessation programs, have been demonstrated to be effective, although effectiveness was dose dependent in terms of frequency of visits and duration of consultation (Anthonisen et al., 2005; Iliceto et al., 2013). Implementation of these programs, however, was often conducted at the policy level (World Health Organization, 2003) and they may not be in synchrony with the stakeholders, both smokers using the service (the users) and the smoking cessation providers. Information on the usefulness of these services are best collected through surveys but often useful information are beyond simple surveys and might require the ‘lived experience’ of the target population. This information could be collected through a qualitative research approach which may assist in explaining certain phenomena (Sandelowsky, 1996). When this approach was combined with quantitative research,
these studies were known as mixed methods research (Tashakkori & Teddlie, 2010b). This research approach has been proven to be useful in ‘blending’ both numbers and narratives which allows a holistic understanding of the issue being studied (Tashakkori & Creswell, 2008). Mixed method studies in smoking cessation are especially limited (Estabrooks et al., 2010).

3.5 User Experience

Most users of smoking cessation services studied were amenable towards programs in assisting them with smoking cessation, whether it was public health or clinical based interventions. In spite of this, smokers often reported wanting to quit on their own terms and at the time of their liking. Previous studies, though, have found that this approach was the least successful (Roddy, Antoniak, Britton, Molyneux, & Lewis, 2006). A quit attempt was often tried when smokers believed they were in a period of stability with little or no stress. Most users nevertheless also reported receptiveness in taking smoking cessation treatments if they were available, but some did report scepticism on the need for these interventions (Roddy et al., 2006; Wiltshire, Bancroft, Parry, & Amos, 2003). This difference was found to be related to smokers’ expectations on how these interventions, in particular medications, worked and what help it could do towards their quit attempt (Hendricks, Wood, & Hall, 2009; Vogt, Hall, & Marteau, 2008). Misinformation, though, was commonly seen and might have influenced the smokers’ decision as to whether to use these effective treatments or not (Wiltshire et al., 2003).

Smokers who were categorised as the ‘underserved’ population such as adolescents (MacDonald, Rothwell, & Moore, 2007), those with mental illness, and the elderly (Kerr, Watson, Tolson, Lough, & Brown, 2006), for example, were reported to require different needs as compared to the general population whereby a general smoking cessation program may not suit them as well. Adolescents in particular reported being unaware they were eligible to access smoking cessation services. In a purposively collected sample of twenty-five adolescent boys and girls from three youth-clubs and two schools in Wales, participants were unaware they could access these services as they were not meant to smoke in the first place. Also, smoking cessation services were often themed for adults, which strengthened this misconception. As they were not meant to smoke due to age, the adolescents interviewed reported concern to visit general practitioners for their smoking for fear of
a breech in confidentiality and that their parents would find out. Despite this, participants for this study would attempt quitting through a smoking cessation program if it was made available and their privacy was ensured (MacDonald et al., 2007). Those with mental illness on the other hand, felt that smoking cessation providers should come from mental health practitioners so their needs would be better taken care of (Morris, Waxmonsky, May, & Giese, 2009). As it was, most of those interviewed reported difficulties to access normal health services as a result of discrimination towards their mental health situation (Morris et al., 2009). By the same token, ethnic minorities also preferred a provider of the same ethnic background or, at the least, a provider who understood their culture and worldview, in helping them to quit smoking (Fernandez & Wilson, 2008; Fu et al., 2007; Thompson-Evans, Glover, & Walker, 2011).

With the strengthening of tobacco control policies worldwide, as discussed in chapter one, smokers have reported being discriminated against. Two studies exploring clean air policies in both the UK (Louka, Maguire, Evans, & Worrell, 2006) and Canada (Bell, McCullough, Salmon, & Bell, 2010) reported similar themes of increasing perceptions of stigmatization as a direct consequence of their smoking. For both studies, it appeared that the intention to protect the wider community from second hand smoking had resulted in present smokers within these two countries feeling disenfranchised from society at large. These findings might cause smoking cessation programs in countries with similar policies to be less popular as smokers feel ‘targeted’ and may even rebel. Some of the interviewees concurred that instead of the intended intention of encouraging quitting, current tobacco control measures might do the opposite, although not all agreed. Some of those interviewed related that current policies worked as intended, and had assisted them to quit smoking (Bell et al., 2010; Louka et al., 2006). Contrary to these two studies, Lawn, Pols, and Barber (2002), reported in their study of twenty-four persons with mental illness, that smoking was said to reduce stigma rather than increase it. Those interviewed reported gaining autonomy from the cigarette instead of losing it. These individuals were purposively sampled from the general population and were those with mental illnesses living in the community. There were some, similar to the initial two studies (Bell et al., 2010; Louka et al., 2006), who also reported feeling fearful of increasing stigma due to their smoking, as clean air policies strengthened. Lawn et al. (2002) termed this as “double dosing” whereby for those with mental illness, discrimination would not only be for their mental health conditions but for their smoking as well.
3.6 Provider Experience

Smoking cessation providers studied were generally willing to conduct smoking cessation programs assigned to them (Bonevski et al., 2011; Wye et al., 2010). Notwithstanding, there were activities for which these providers were willing to do more compared to others. In a study of providers for relapse prevention interventions for example, those interviewed were more inclined to provide face-to-face sessions as opposed to telephone counselling (Agboola, Coleman, & McNeill, 2009). Although repetitive advice to quit smoking was more effective and encouraged to be given by many groups of health providers (Ministry of Health, 2007; Tobacco Use and Dependence Guideline Panel, 2008), certain groups such as the general practitioners were reported as not being as keen to repeat themselves for fear of being perceived as “nagging” (Coleman, Cheater, & Murphy, 2004). General practitioners in this same study suggested that during their interviews they used a more emphatic or “confrontational” advice style, although this was not seen on video-recordings of their consultation sessions (Coleman et al., 2004). Health services without a smoking cessation program were also willing and interested in starting these programs and were receptive to policy changes to support such initiatives (Ashton, Lawn, & Hosking, 2010; Wye et al., 2010). This initiative in certain establishments had also encouraged staff, especially those implementing these policies, to quit smoking first as they understood their job and the need to become role models (Veny et al., 2011).

There were, however, reports of providers of services being resistant to, or having difficulties in, providing adequate service due to various reasons such as time, work load, training and limited resources (Vogt, Hall, & Marteau, 2005). In their review, Vogt and colleagues (2005), examined nineteen studies and found eight negative attitudes by both general practitioners and family physicians as to why they were reluctant to discuss smoking cessation with their smoking patients. More importantly, and of concern, was that a third (33%) of participants reported that treatments were ineffective. This review was similar to another review on psychiatrists (Amer Siddiq et al., 2015), which found service implementation lacked impetus due to a lack of confidence amongst psychiatrists. Not surprisingly, a lack of confidence was also reported in nearly a quarter (22%) of the general practitioners and family physicians studied who did not provide adequate services (Vogt et al., 2005). Having an unclear definition of the terminology for treatment might also be at fault. In a study by Agboola et al. (2009), sixteen smoking cessation providers were interviewed and
none shared a common definition of relapse prevention intervention, which was the intervention studied. The definitions provided by the participants was based on their practice and how their respective organizations saw relapse prevention intervention. Therefore, for this group, relapse prevention meant anything from interventions to prevent lapses, to treat a lapse, or even to treat a relapsed smoker. The lack of a standard definition might affect current service provision and impact on future outcomes. These examples provide an understanding of the challenges faced within the field amongst providers. Better training conversely was shown to improve service provisions and might need further investigation (Carson et al., 2012).

3.7 Currently Available Cessation Treatments

3.7.1 Self-Quitting

Quitting without any aid or self-quitting has been around for many years, however, it is often not discussed and neglected (Smith & Chapman, 2014). This method of quitting can be understood as any method not using smoking cessation treatment such as taxation and smoke-free areas or only receiving brief advice or using quitline services without any follow-up or medication (Smith, Carter, Dunlop, Freeman, & Chapman, 2015). In their commentary, (Chapman & MacKenzie, 2010) argued more individuals quit through self-quitting rather than using any smoking cessation aids. One possible reason given for this oversight was the agenda to medicalise health (Chapman & MacKenzie, 2010), moreover, after the declaration that smoking was an addiction by the U.S. Surgeon General (U.S. Department of Health and Human Services, 1988). Although a greater number of individuals quit smoking each year on their own, emphasis has always been to quit with the various smoking cessation aids (section 3.7.3) due to the understanding that success is reported to be at least double compared to without any aid (Hatsukami, Stead, & Gupta, 2008). Although this may be true in clinical trial settings, real world data has been less optimistic. In a study of Australians, 54 % to 69% of ex-smokers quit on their own whilst 41% to 58% of current smokers have attempted to quit smoking unassisted (Smith, Chapman, & Dunlop, 2013). However, despite this popularity in unassisted quitting, not much has been researched about this group of people.

As a result of this reduced interest in exploring self-quitting amongst researchers in smoking cessation, there is little information about this population. To better understand this phenomenon, (Smith et al., 2015) conducted a review comprising of
11 qualitative studies, which found three themes linked to self-quitting. These three were motivation, willpower and commitment. Interestingly, the theme motivation was found to relate to the reasons for quitting by the participants in this study. It was not clear to what extent the strength of motivation was considering that participants could not recall their motivation at the time of quitting. Commitment as a theme however appeared more convincing in successful quitting without assistance. The final theme of will-power in this study at least related to many things which appeared to provide an understanding closest to success. More studies, however are need to better understand people who use this method to quit in the future.

Despite the evidence suggesting that assisted treatment has a greater outcome for success compared to self-quitting (Hatsukami et al., 2008), it is important that both be considered when advising smokers to quit their addiction due to popularity of self-quitting. As a result of the complexities of smoking as seen in section 3.3 and similarly the complexities of quitting smoking (Smith, Carter, Dunlop, Freeman, & Chapman, 2017), it is wise that the tobacco treatment specialist be familiar with all methods to quit smoking to obtain greater success in their task.

### 3.7.2 Behavioural

An extensive review of current behavioural treatments is provided in the US Clinical Practice Guideline (Tobacco Use and Dependence Guideline Panel, 2008). Essentially, the more intensive the treatment method, the greater the success; and combining one or more behavioural methods is shown to further increase success. Three newer forms of behavioural treatments, which were introduced for smoking cessation, were motivational interviewing, mindfulness therapy and relapse prevention. Both motivational interviewing and relapse prevention were mentioned in the guidelines by the Tobacco Use and Dependence Guideline Panel (Tobacco Use and Dependence Guideline Panel, 2008) and, although included in the New Zealand guideline (Ministry of Health, 2007), were not extensively elaborated on. Mindfulness was, however, not mentioned at all due to its novelty within the smoking cessation field. These three interventions are discussed briefly together with their treatment effectiveness.

Motivational interviewing (MI) was introduced by Miller and Rollnick (2002) initially for the treatment of alcohol problems. It is a person-centred strategic treatment which elicits motivations for change. There are two published reviews by the Cochrane
investigating its effectiveness for smoking cessation. The latest review reported similar modest benefit to the review conducted earlier (Lai et al., 2010) in smoking cessation, RR 1.26 CI (1.16-1.36) after reviewing 28 studies involving 16,803 participants. In the latest review, MI conducted by a physician was three times more effective, than MI conducted by other health care providers, RR 3.49 CI (1.53-7.94) (Lindson-Hawley et al., 2015). In another review with 35 studies and nearly 10,000 participants, Heckman, Egleston, and Hofmann (2010), found similar benefits to Lindson-Hawley et al. (2015) for the use of MI in smoking cessation, but with a lesser magnitude, RR 1.45 CI (1.14-1.83). The main difference, however, in this same review was that it found no difference in MI effectiveness depending on who provided the intervention, and the MI effects were best seen between 10-12 weeks.

Mindfulness training was first introduced by Kabat-Zinn (1982), for the care of patients with chronic pain. Mindfulness training was described as a way to train one’s attention to the present. There were two parts to mindfulness training, namely maintaining attention on the individual’s immediate state, and maintaining an attitude of acceptance towards these experiences, both physical and mental (for example breathing, thoughts and body sensations). Brewer et al. (2011), in a preliminary study, investigated mindfulness training compared with behaviour treatment involving a combination of behaviour modification, relaxation and relapse prevention. The investigators found mindfulness training assisted in helping participants to be abstinent at week 4 and effects were maintained at week 17. While the limitations of this study were a small sample size (n=88) and short end point (week 4), it nevertheless was the first in testing this treatment on its own. There has since been a meta-analysis of randomised controlled trials of mindfulness training and its effectiveness for smoking cessation conducted (Oikonomou, Arvanitis, & Sokolove, 2016). This meta-analysis found that of the four studies included, the pooled results of 474 patients found mindfulness training to improve long-term smoking cessation (> 4 months) compared to those who received usual care, RR 1.88 CI (1.04 – 3.40). Therefore, mindfulness training is a useful behavioural treatment alternative for smoking cessation.

Relapse prevention was introduced by Marlett and Gordon to assist clients with alcohol and drug problems (Marlatt & Donovan, 2005). The mainstay of relapse prevention training is the ability to anticipate and resist high risk situations and
cognitive restructuring to deal with self-defeating attributes on a lapse (Marlatt & Donovan, 2005). Although there was much anticipation about its use in smoking cessation, a Cochrane review (Hajek, Stead, West, Jarvis, & Lancaster, 2009) which examined 36 trials found no benefit from relapse prevention. Evidence did not show any significant differences in using either skills training or other pharmacological interventions, apart from varenicline, to avoid relapse in this review RR 1.18 CI (1.03 – 1.36).

In summary, each behavioural treatment described has its own use and, apart from relapse prevention, may be beneficial for those addicted to nicotine and wanting to quit smoking. It is important that all treatment providers, especially the tobacco treatment specialists, be familiar with these newer forms of behavioural treatment, together with more established methods, to further assist their patients when providing smoking cessation.

3.7.3 Pharmacological

There are currently seven pharmacological agents that have been approved by the US Food and Drugs Administration (FDA) (Elrashidi & Ebbert, 2014). These are divided into two types: nicotine replacement therapies (NRT) and non-NRTs. NRTs are the most commonly used for tobacco dependence, and treatments available include patches, gum, lozenges, inhalers and nasal sprays. These agents act by replacing nicotine, thereby reducing withdrawal symptoms. The dose of nicotine is usually lower in NRTs compared to cigarettes as a result of its delivery method, and there is less peaking of plasma levels (as one would get from smoking tobacco) on use. Therefore smokers do not get the same ‘reward’ as they get from a cigarette, although peak plasma level can be reached more rapidly for inhalers and nasal sprays and provide much needed relief for the most severely addicted. Studies have shown that NRTs are effective and increase the quit rate by 50-70% irrespective of setting compared to placebo, are safe and the risk to develop dependence is low (Stead et al., 2012).

The FDA has approved two non-NRT agents: bupropion and varenicline (Elrashidi & Ebbert, 2014). Bupropion was initially marketed as an antidepressant but was found to be useful in quitting smoking. The mechanism of action for smoking cessation, however, is not fully understood (Holm & Spencer, 2000). It is thought to inhibit the neuronal uptake of dopamine and noradrenaline together, and also have a weak
nAchR antagonist effect (Berrettini & Lerman, 2005; Caponnetto, Russo, & Polosa, 2012). Bupropion doubles the quit rate over placebo (Hartmann-Boyce, Stead, Cahill, & Lancaster, 2014). A meta-analysis by Wu, Wilson, Dimoulas, and Mills (2006) reported that bupropion was effective at both three months and one year compared to placebo, OR 2.13 CI (1.72-2.64) and OR 1.56 CI (1.10-2.21) respectively from 11 studies. Varenicline was the latest medication approved by the FDA for tobacco dependence treatment in 2006. Varenicline is a partial nAchR agonist. It acts at the receptor by both partially stimulating the receptor and at the same time acting as an antagonist for nicotine from tobacco on the same receptor. In the same meta-analysis by Wu et al. (2006), using four available placebo controlled trials, varenicline was found to be effective at three months and one year and was also superior to bupropion. Varenicline was reported to be the most effective treatment available, tripling the quit rate compared to no treatment (Anthenelli et al., 2016).

Although included in most guidelines (Ministry of Health, 2007; Tobacco Use and Dependence Guideline Panel, 2008), two other pharmacological treatments, namely nortriptyline and clonidine, are yet to be approved by the FDA for tobacco dependence treatments. Nortriptyline is a similar antidepressant to bupropion. As with bupropion, the method of action is not yet well understood. However, it has been theorized that its antidepressant effects and action on the noradrenergic system are the mode of action (Caponnetto et al., 2012). Neither of these antidepressants are serotonin selective receptor inhibitor (SSRI) class antidepressants, which have been found to be ineffective for smoking cessation (Hughes et al., 2007). Clonidine on the other hand was marketed as an antihypertensive medication. It is a α-adrenergic agonist drug and acts in the central nervous system to reduce sympathetic outflow. The mechanism of action in smoking cessation is believed to be primarily through its ability to counteract symptoms of withdrawal. The efficacy of both these agents is roughly similar; both double the quit rate compared to placebo (Gourlay, Stead, & Benowitz, 2004; Hughes, Stead, & Lancaster, 2005). Both medications have been considered as second-line treatment, utilized after the others have failed, but have required due diligence in their use due to their possible effects on the cardiovascular system (Hartmann-Boyce & Aveyard, 2016).

Despite the efficacy of current treatments, the rate of reinstatement or relapse after a quit attempt is still significant, with rates reported at 30 – 50% in clinical settings (Lee, Hassali, & Shafie, 2013). Despite this, relapse rates have not often been measured
(Hughes, Keely, & Naud, 2004). Most of the NRT treatments reported did not reach the brain as quickly as nicotine from cigarettes, and therefore patients still reported withdrawal symptoms (Balfour & Fagerström, 1996). Newer pharmacological agents were needed which might have different properties, different delivery devices or which acted on different receptors or pathways. Some newer medications have included inhaled nicotine formulation, monoamine oxidase inhibitors, the use of natural nicotinic ligands with partial agonist activities, cannabinoid receptor 1 antagonists, and dopamine D3 receptor antagonists (Caponnetto et al., 2012). One medication which holds promise is cystisine, having had a randomised clinical trial completed (Walker et al., 2014). This medication was initially reported to being used in Eastern European countries, particularly Poland and Bulgaria, to treat smoking. It was not considered seriously until Walker et al. (2014) reported the benefits of its use for smoking cessation. In this study, cystisine was found to be superior to the NRTs (patches and gums) when used with behavioural support (40% vs. 31%). However, participants in the cystisine arm complained of more side effects from their treatments compared to those on NRTs. Other treatments which were initially promising have since been withdrawn, such as tarabant and rimonobant; (both cannabinoid type 1 receptor antagonists) due to safety concerns over particular neuropsychiatric complications such as depression, anxiety and suicidal behaviour (Cahill, Lancaster, & Perera, 2011). Prior to rimonobant being withdrawn, there were positive indications that it might also assist in weight gain after quitting (Cahill et al., 2011).

In addition to looking at the receptors that bind with nicotine, another novel approach was to target the nicotine from tobacco smoking itself. Vaccines for nicotine addiction were developed for this purpose and there were at least four long-term clinical trials involving 2642 participants (Hartmann-Boyce, Cahill, Hatsukami, & Cornuz, 2012). Through the use of vaccines, less nicotine reached the brain and therefore there was less of a ‘reward’ effect to initiate or maintain this addiction. As nicotine molecules are very small, the vaccine development required the combination of the nicotine molecule with a larger protein, usually from a bacterium or virus. In theory the vaccines appeared feasible with promising animal studies in support yet, in clinical practice, it has not materialised, and therefore no vaccines are recommended at present for smoking cessation (Hartmann-Boyce et al., 2012). The development and subsequent use of vaccines was also not without its controversies. The main mechanism was to develop an immune response towards nicotine, and this led to
identified ethical issues which were not thought of, or expected, at the onset (Wolters, Wert, Schayck, & Horstman, 2014).

Another recent innovation is the use of electronic cigarettes. These are electronic devices which are similar in shape and, at times, colour to cigarettes but do not combust tobacco. Instead, these electronic gadgets vaporise liquid (termed e-liquid, a mixture of several constituents including nicotine) in order to deliver its dose of nicotine. The electronic cigarette was first introduced in China in 2006, and has since been widely sold with little regulation till recently (Etter & Bullen, 2011). Bullen et al. (2013), published the first study which used the electronic cigarette as a treatment aid. In this study, the authors concluded that electronic cigarettes were no different from NRT patches in assisting patients to quit smoking. This study, however, had a small sample size and significant drop-out, and therefore their conclusions need to be interpreted cautiously. A Cochrane review of two studies, however, found that there was inconclusive evidence to suggest that electronic cigarettes were effective as a smoking cessation aid for the long-term. An updated Cochrane review did not find additional studies to include in the analysis to answer whether electronic cigarettes were effective for smoking cessation, and therefore maintained the same conclusions as the previous review (Hartmann-Boyce et al., 2016). The review, however, did find that participants using these devices did reduce their cigarette consumption compared to abstinence (McRobbie, Bullen, Hartmann-Boyce, & Hajek, 2014), which is often the goal for smoking cessation. Among the proclaimed benefits by users of electronic cigarettes was the possibility to assist in the behavioural aspects, particularly the handling, holding and puffing a cigarette which is often lacking in currently available NRTs (Caponnetto et al., 2012).

In summary, current available pharmacological agents are effective to aid in smoking cessation compared to no treatment. However, rates of relapse can still be high. Available treatments which deliver nicotine, such as NRTs, are still unable to deliver nicotine to the system as rapidly as cigarettes, resulting in periodic withdrawal symptoms still present. Non-NRT medications work differently and have been shown to be more effective compared to NRTs. However, both bupropion and varenicline need time to work. Therefore, there is a need to further innovate through the many pharmaceutical agents in various phases of development. Electronic cigarettes, although able to deliver nicotine more rapidly compared to current available treatments, have not been found to be effective, and have in some studies found to
have other harmful results in its use (Kalkhoran & Glantz, 2016; McNeill et al., 2015; West et al., 2015)

3.7.4 Combination

Despite the effectiveness of both behavioural and pharmacological methods to quit smoking independently, the current recommendations are to use them together. Stead, Koilpillai, Fanshawe, and Lancaster (2016) in their review found that combination was better compared to individual forms of treatment in smoking cessation. Moreover, in this review it was found that combination was particularly better for those in a healthcare setting compared to community, RR 1.97 CI (1.79 to 2.18) compared to RR 1.53 CI (1.33 to 1.76). A total of 52 publications were included in this analysis and quit outcomes were measured at six month or more. Therefore, current guidelines recommend the use of combination treatment where possible (Ministry of Health, 2014).

3.8 Barriers and Challenges for Smoking Cessation

In countries where smoking cessation treatments are not funded, financial costs appear to be a major barrier for smokers to initiate and continue quitting smoking (Krist et al., 2010). This has also been reported in larger population studies (M. Siahpush et al., 2009). Where there was consideration to incentivise, users of smoking cessation programs were reported to be more positive than their providers when interviewed (Bonevski, Bryant, & Paul, 2011). In another qualitative in-depth interview of 14 clients of an incentivised service, Allan, Radley, and Williams (2012) reported on the Scotland experience where providing incentives did not achieve its objective. Instead, incentivising caused increased stigma and reduced self-efficacy in the smokers who were utilising such services. These interviews were supported by a recent extensive review which found that despite ‘incentivising’, particularly financially, there was still insufficient evidence to show that it led to increasing quit smoking rates. Improvement in other areas of smoking cessation such as recording smoking status, visitations to quit clinics and referrals was seen to increase (Hamilton, Greaves, Majeed, & Millett, 2013).

For certain individuals, accessing services is also a barrier. Most smoking cessation programs are structured services with set rules and standards, such as the National Health Service (NHS) in the United Kingdom (Bauld, Bell, McCullough, Richardson, & Greaves, 2010). These services often include standard visiting hours, treatment
provision and location (Allan et al., 2012). For certain populations, these structured services might be difficult to access, such as those with financial difficulties (Bryant, Bonevski, Paul, O'Brien, & Oakes, 2010), adolescent smokers still in schools (MacDonald et al., 2007), or those with mental illness (Morris et al., 2009). At times, these services and their respective policies are also found to affect providers. Some of the concerns which have been reported by service providers have been mentioned earlier (refer to 3.5). This includes training or lack of it, financial reimbursement for services provided (Krist et al., 2010), and health system issues, for example, whether a service is a referral centre or not (Wilson et al., 2010).

The awareness of the benefits of quitting and reach of services has also been seen as an issue for some. In support of larger epidemiological studies, a number of qualitative studies reported adolescent participants continuing to initiate smoking through peer pressure (Green & Clarke, 2005) despite the various tobacco control measures put in place. One possible reason given is that current measures were not targeting adolescents as well as it was hoped for (Staten & Ridner, 2007). In this study, adolescents reported to ignore advice if the campaign or message did not appeal to them. One participant summed the feeling of those involved: “If the message doesn’t speak to me, I don’t hear it”. This statement indicated frustration, defiance, and also hope to access available treatment facilities.

The lack of positive coping skills with life situations appears to be a major factor for smoking, lapse and relapse (Khaled et al., 2011). Poor coping skills and boredom was especially raised by almost all smokers studied, who experienced mental illness (Morris et al., 2009; Snyder, McDevitt, & Painter, 2008; Tsourtos et al., 2011; Wiltshire et al., 2003). Those with mental illness reported the need to smoke to control stress (Lawn et al., 2002). For the successful quitters and non-smokers studied, those who succeeded in abstaining from smoking reported using other mechanisms of coping in times of stress (Tsourtos et al., 2011). Therefore, brief intervention, a form of behavioural treatment, is important and might make the difference, particularly for the disadvantaged groups. Resilience in response to stress was also raised by two studies (Lin & Ward, 2012; Tsourtos et al., 2011), however, more research is needed to investigate this observation.
3.9 Summary

The term smoking cessation has been used interchangeably with tobacco dependence treatment to describe the treatment of smoking. For this thesis, however, the former is preferred due to its established use within the literature. Population types of smoking cessation programmes such as Quitline, or clinical based programmes such as face-to-face or group treatments, are both useful. The introduction of smoking cessation programmes has led to the development of tobacco treatment specialist, health care providers with extensive experience and knowledge in providing smoking cessation. Often, these same clinicians are adept at the many smoking cessation treatments available using both behavioural and pharmacological techniques, and are experienced at treating a wide variety of smokers both from the general population, and from special populations such as those with mental illness, those from lower socio-economic backgrounds, or those with co-morbid physical health problems.

In spite of the many treatments available to assist people to stop smoking, the relapse rate is still unsatisfactory. A number of predictors have been identified which increase one’s risk to relapse. These predictors include demographic predictors like age and gender; tobacco related predictors such as duration of smoking and number of quit attempts; psychosocial predictors such as stress; and treatment predictors such as duration or frequency of treatment sessions. However, there are still gaps within the literature on further investigations into smoking cessation predictors.

This chapter highlights what smoking cessation is dependent on, whether the understanding is from the user’s perspective or the treatment provider’s perspective. The two perspectives can be very different, with different outcome expectations. An area which is lacking in smoking cessation research is the combined qualitative and mixed method research. Both types of research are useful in further exploring and understanding smoking cessation from both user and provider perspectives. This will allow a better understanding of the individual’s or group’s impact towards quitting smoking in New Zealand. There is also a difference between treating the general population of smokers, and those with special needs, such as mental illness, the latter requiring more intensive treatments, for example.

Finally, this chapter highlights the barriers to treatment. Among barriers identified were the cost of treatment for some populations, access to treatment for others, and
the awareness of these treatments being made available. However, more information is needed to better understand barriers present for New Zealand smokers wishing to quit smoking.
CHAPTER 4 - Literature Review: Smoking Cessation and Depression

4.1 Chapter Overview

This chapter will endeavour to bring together the literature on depression, smoking, and smoking cessation in order to better understand the relationship between the three main issues at hand. It will start with an outline on depression, and continue by connecting it with smoking and, eventually, smoking cessation. This chapter will end with a summary to identify possible gaps within the literature which need further study.

4.2 Depression

4.2.1 Epidemiology

Depression is among the most prevalent mental health conditions worldwide and one of the most debilitating (Murray & Lopez, 1997b; Üstün, Ayuso-Mateos, Chatterji, Mathers, & Murray, 2004). The World Health Organization (WHO) ranks depression as the fourth leading cause of global burden of illness (Murray & Lopez, 1997b), and it is expected to move to first place by 2030 (World Health Organization, 2004). According to an alternative analysis, for developing nations, depression will be the leading cause of global burden of illness a decade earlier (Murray & Lopez, 1997a).

Epidemiological studies vary in their estimation of mental health prevalence between countries. However, there is a general agreement that depression is the most common mental health condition after anxiety disorders (Kessler & Zhao, 2010; Ministry of Health, 2012; Slade, Johnston, Oakley Browne, Andrews, & Whiteford, 2009). Kessler and Bromet (2013), using the WHO World Mental Health Survey (WMH), reported a study of 18 countries across all continents in which the prevalence of depression (major depressive disorder) in high income countries nations was found to be 14.2% compared to 11.1% in low to lower middle income countries. In response to previous limitations in other studies, this study utilised the WHO CIDI version 3, a common instrument and standardised protocol to generate findings. Although lifetime prevalence differed between high income countries and low to lower middle income countries, when current depression was studied, the prevalence was nearly the same between the two categories (5.5% vs. 5.9%). Age of onset was during early adulthood, and risk factors were similar in terms of gender,
age and marital status. Females were two times more likely to suffer depression than men. These findings, from all of the world’s continents, confirm that depression is very similar in both the form of occurrence, and presentation, despite differences in culture and socio-economic status.

In New Zealand, a national health survey of 12,370 adults aged 15 and older, reported that 16% of the country’s population was suffering from mental illness (Ministry of Health, 2012). This same report found that 14% of those with mental illness had depression. Similar to findings by Kessler and Bromet (2013), women were doubly affected. Peak ages of onset were between 16 to 34 years of age. In this study, similar to the WHO World Mental Health Survey looking at high income countries, those with depression more often came from a lower socioeconomic group. In the national survey, those with European ancestries had higher mental health prevalence than Māori, 19% vs. 16%. However, it was difficult to ascertain a more accurate diagnosis of the data, as mental health classifications (depression, anxiety disorder and bipolar disorder) were grouped together and not broken down into individual diagnoses (Ministry of Health, 2012).

The New Zealand Mental Health Survey 2006 was the first national survey attempting to specifically gather information on the mental health situation in the country (Oakley, Wells, & Scott, 2006). This study involved 12,992 participants of which 20% (n = 2,595) were Māori, the largest survey in which ethnic minorities were overrepresented. Lifetime prevalence of depression was 15.7% and current depression, 6.9%. Their risk of developing a mood disorder, compared to other groups in the countries, was also higher OR 1.5 CI (1.4-1.7).

4.2.2 Aetiology

Clinical observations of depression occurring within families are consistent with genetic studies using twin and adoption studies (Kendler, Gatz, Gardner, & Pedersen, 2006; Levinson, 2006). Linking depression to the human genome using linkage studies, though, has been less convincing (Goodwin, 2009; Levinson, 2006). Linkage studies have been used to test hypotheses that a linkage relationship exists between known genetic markers and an identified trait. Temperament might also be implicated in the aetiology of depression (Goodwin, 2009). Although linked to some extent with genetics, temperament has been harder to prove (Goodwin, 2009). Early adversity was also found to be related to the development of depression and may be
associated with both genetic risk and temperament (Saveanu & Nemeroff, 2012). The relationship between the three – genetics, temperament and early adversity – might indeed have a part in the predisposition, precipitation and maintenance of depression (Goodwin, 2009).

Neurobiologically, the monoamine oxidase system (MAO) is implicated in the aetiology for depression (Hamon & Blier, 2013; Saveanu & Nemeroff, 2012). Although serotonin, noradrenaline and dopamine are all involved with the MAO, serotonin is thought to have a larger role in depression (Saveanu & Nemeroff, 2012). Tryptophan, the precursor of serotonin, is reduced in depressed individuals and they are often found to have abnormalities in both production and utilisation of this neurotransmitter. Post-mortem and imaging studies have also reported reduced serotonin transporter binding sites in various parts of the brain (Goodwin, 2009; Saveanu & Nemeroff, 2012). Moreover, challenging depressed individuals with serotonin, using antidepressants such as the serotonin selective reuptake inhibitor (SSRI), has been shown to reverse depressive symptoms. Those with the s allele of the promoter region of the SERT gene (SLC 6A4), a gene important in serotonin production in the central nervous system, have also been found to develop depression at an earlier age and noticed to be more susceptible to early adversity (Saveanu & Nemeroff, 2012).

4.2.3 Types of Depression

Depression is essentially a clinical diagnosis made through careful history taking by an experienced clinician. Two major classifications used to make the diagnosis are the DSM and ICD (American Psychiatric Association, 2000; World Health Organization, 1993). Symptoms need to be present for two weeks or longer and cause impaired functioning in activities of daily living. The core symptoms are depressed mood and the inability to enjoy normal pleasurable activities; they also include other non-core symptoms (refer to Table 3.1). In both classifications, mood disorders encompass bipolar disorder, cyclothymia, dysthymia and major depressive disorder (MDD). When depressive symptoms are present but do not fulfil the full requirements for any of the mood disorders mentioned, they are classified differently. The DSM includes, for example, diagnoses such as depressive disorder not otherwise specified, depressive disorder due to a general medical condition, substance induced mood disorder, and mood disorder not otherwise specified. The ICD includes persistent mood disorder or unspecific mood disorder to classify those
with depressive symptoms which do not meet criteria for a major depressive disorder (American Psychiatric Association, 2000; World Health Organization, 1993).

Minor depression, otherwise also known as subclinical, subthreshold or subsyndromal depression, is classified in the DSM-IV as a depressive disorder not otherwise specified, or as mild depression in the ICD. Minor depression is considered to be a clinical depressive disorder which does not meet the full criteria as per the DSM or ICD for MDD, but argued to be still within the continuum of what is considered depression (Judd, Akiskal, Zeller, & et al., 2000) (American Psychiatric Association, 2000; Judd et al., 2000; World Health Organization, 1993). Meanwhile, others argue that minor depression is a discrete entity and should not be linked to MDD (Borrelli et al., 1999). Similarities between minor depression and MDD include both aetiology and genetic risk (Pietrzak et al., 2013). Those with minor depression are at risk of developing full MDD, and have health disabilities similar to major depressive disorder (Pietrzak et al., 2013). Moreover, minor depression may linger after a severe episode of major depressive disorder; therefore clinicians need to monitor on-going residual symptoms which might meet criteria (Judd et al., 2000).

For ease and clarity of subsequent sections of this chapter, the term ‘depression’ will be used throughout for both minor depression and major depressive disorder. Where a distinction needs to be made, the terms ‘minor depression’ and ‘major depressive disorder’ will be used respectively.

**Table 4.1: Major depressive disorder symptoms for diagnosis using DSM-IV-TR and ICD-10**

**Core symptoms:**
1. Depressed mood
2. Inability to enjoy pleasurable activities (anhedonia)

**Additional symptoms:**
1. Poor concentration, or difficulty in concentrating
2. Reduced self-esteem or self-worth (ICD-10 only)
3. Feelings of guilt or unworthiness
4. Pessimistic view of the future (ICD-10 only)
5. Poor or disturbed sleep
6. Change in activity (psychomotor retardation) (DSM-IV only)
7. Diminished appetite or weight change (5%)
8. Fatigue or loss of energy
9. Suicidal or self-harming thoughts
4.2.4 Burden of Depression

Depression increases both morbidity and mortality in those affected. Depression is associated with a variety of physical illnesses and is also a leading cause of suicide (Kessler & Bromet, 2013; Pietrzak et al., 2013). A recent review of twenty-eight papers, aimed at identifying risk factors for suicide, reported that those with severe depression were at twice the risk of suicide, OR 2.2 CI (1.05 – 4.60). In addition, hopelessness as a symptom was found to be the major risk factor in those who were depressed, OR 2.2 CI (1.49 - 3.23) (Hawton, Casañas i Comabella, Haw, & Saunders, 2013). Psychosocial disability also increased in those with depression compared to individuals without (Judd et al., 2000). Moreover, for every detected and diagnosed occurrences of depression, there were many more which were undiagnosed, untreated and therefore posed a risk for harm (Pierre, 2013). Cost-of-illness (COI), which includes both direct and intangible costs, is estimated to be between USD2000 to USD3700 per person per year (Luppa, Heinrich, Angermeyer, König, & Riedel-Heller, 2007). This study, however, did not include many low to lower middle income countries and is therefore unlikely to be representative of depression globally. In New Zealand, the estimated cost-of-illness to the country has been reported at NZD 750 million per year (Ministry of Health, 2010). This figure was calculated using the United Kingdom as reference, where cost-of-illness was estimated at 0.6% of gross domestic product (GDP), and was based on GDP data in 2006.

4.3 Relationship between Depression and Smoking

4.3.1 Epidemiology

The study by Hughes, Hatsukami, Mitchell, and Dahlgren (1986), was one of the earliest studies in reporting interest in depression among smokers, despite smoking having been present for hundreds of years. One possible reason for the lack of information until then was the previous low interest in psychiatry towards tobacco control (refer to section 2.4). In this study by Hughes et al. (1986), when comparing smoking rates between attendees of a psychiatric outpatient service and the general population, those with a psychiatric illness were 1.6 times more likely to smoke compared to general population controls. Even after controlling for multiple confounders, the association was still significant. Hughes et al. (1986) also found that those with schizophrenia smoked more than those with mania and depression, in that
order. In a smoking cessation trial looking at the effectiveness of clonidine for nicotine withdrawal, Glassman, Stetner, Walsh, & et al., (1988) observed that 61% of those with a previous history of depression smoked. More importantly, those without a history of depression, irrespective of medication assignment, did better. Both epidemiological (Boden et al., 2010; Brown, Lewinsohn, Seeley, & Wagner, 1996; Fergusson et al., 2003; John, Meyer, Rumpf, & Hapke, 2004; Johnson & Breslau, 2006; Kendler et al., 1993) and clinical (Glassman, Covey, Stetner, & Rivelli, 2001; Japuntich et al., 2007) studies have since found an association between smoking and depression.

In comparison to the Glassman et al. (1988) study, prevalence of lifetime or previous depression has been reported between 11-52.5% (refer to Table 4.2). This has often been reported to be higher than that of the general population; however, no studies have been able to replicate the prevalence reported by Glassman et al., (1988). Current depression prevalence among smokers has been studied less. Available studies reported prevalence between 2-34.3% (refer to Table 4.3). Leventhal, Kahler, Ray, and Zimmerman (2009), reported a current depression prevalence of 57.8% in their study. This study involved 1800 participants where 352 were nicotine dependent. However, participants were recruited from psychiatric outpatient services and therefore it was likely that more cases were detected. A variation in prevalence for both lifetime and current depression might be explained by the population sampled (clinical vs. general), measurements for depression (face-to-face vs. self-report) and study design (cross-sectional vs. longitudinal vs. randomised controlled trials) (Refer to Tables 4.2 and 4.3).

There are limited New Zealand studies to date. Tobias et al. (2008), using data from the 2003-4 New Zealand Mental Health Survey, found that in those with any mental illness, nearly a third (32.3%) were smokers, which was higher than the national average during the same period (32% versus 21%, p <0.05). This study included 12,992 participants with an over sampling of at risk groups, namely Māori and Pacific people, and a 73% response rate. Thirty-four per cent of those with a current mood disorder were noted to smoke. The majority of these had depression. Although this study had a large sample size, limitations included the survey being done on those 16 years and older, it did not include those in residential institutions, and the smoking information was based on a single item question. The findings, however, were supported by Fergusson et al. (2003), using the Christchurch Health and
Development Study (CHDS), a longitudinal study of 1265 children studied from birth to age 21. Using three time points (16, 18 and 21 years), Fergusson and colleagues (2003) were able to consistently show that those with depression at each time point were smoking more cigarettes and were more dependent on nicotine than those without depression (p< 0.001). In another study, Glover (2005) reported that over a third of smokers had a past history of depression. This study included only Māori participants, and depression was reported using the Māori worldview for defining depression. This definition includes the description of depression based on the 4 realms provided by Te Whare Tapa Wha. In this Māori worldview, depression includes a physical element, feelings and thoughts, a spiritual component, and also how this condition affects relationships in the family. Participants were also sampled among attendees of a focus group. Both measurement for depression and population might have introduced bias in the result. This study, however, concurred with Tobias et al. (2008), where it was reported that those with depression smoked more compared to the general population in New Zealand, irrespective of ethnicity.

To summarise, the literature suggests a relationship between depression and smoking whereby those with depression are found to have higher rates of smoking than those without depression. Despite this, local studies have been limited, and have often used very different methodologies. Therefore, there is an opportunity to study this relationship further in New Zealand.
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Recruitment Country</th>
<th>Study Design</th>
<th>N and Population</th>
<th>Instrument/Measure Depression</th>
<th>Depression Prevalence</th>
<th>Comments/ Predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Glassman et al., 1988)</td>
<td>USA</td>
<td>RCT</td>
<td>80 adults</td>
<td>SADS</td>
<td>61%</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>S. M. Hall, Munoz, &amp; Reus, 1990</td>
<td>USA</td>
<td>RCT</td>
<td>65 adults</td>
<td>DIS</td>
<td>46%</td>
<td>Secondary analysis</td>
</tr>
<tr>
<td>3</td>
<td>S. M. Hall, Munoz, &amp; Reus, 1991</td>
<td>USA</td>
<td>RCT</td>
<td>149 adults</td>
<td>DI</td>
<td>31%</td>
<td>Depression + less likely abstinence</td>
</tr>
<tr>
<td>4</td>
<td>Breslau, Kilbey, &amp; Andreski, 1991</td>
<td>USA</td>
<td>Cross-sectional</td>
<td>1007 adults</td>
<td>DIS</td>
<td>19.2 -39%</td>
<td>Depression depending on severity of dependence</td>
</tr>
<tr>
<td>5</td>
<td>K. Kendler et al., 1993</td>
<td>USA</td>
<td>Co-twin control method</td>
<td>1566 female twins</td>
<td>SCID</td>
<td>31.5%</td>
<td>Increase in lifetime depression with increasing cigarette use 24.9% NS vs. 51.7% in smokers</td>
</tr>
<tr>
<td>6</td>
<td>Ginsberg, Hall, Reus, &amp; Muñoz, 1995</td>
<td>USA</td>
<td>RCT</td>
<td>62 adults</td>
<td>DIS</td>
<td>44%</td>
<td>Lifetime depression did not affect quitting at 52 weeks</td>
</tr>
<tr>
<td>7</td>
<td>Brown et al., 1996</td>
<td>USA</td>
<td>Longitudinal</td>
<td>1709 adolescents</td>
<td>SADS</td>
<td>32%</td>
<td>Depression predicted smoking onset by 2 times (adjusted). Smoking also predicted incidence of depression</td>
</tr>
<tr>
<td>8</td>
<td>Breslau, Peterson, Schultz, Chilcoat, &amp; Andreski, 1998</td>
<td>USA</td>
<td>Longitudinal</td>
<td>1007 adults</td>
<td>DIS</td>
<td>22.4%</td>
<td>3 times likely to smoke with history of depression but did not reduce rate of quitting. History of smoking at baseline increased risk for depression</td>
</tr>
<tr>
<td>9</td>
<td>Borrelli et al., 1999</td>
<td>USA</td>
<td>RCT</td>
<td>281 adult women</td>
<td>CES-D</td>
<td>18.2%</td>
<td>12% were subsyndromal</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Recruitment Country</td>
<td>Study Design</td>
<td>N and Population</td>
<td>Instrument/Measure Depression</td>
<td>Depression Prevalence</td>
<td>Comments/ Predictors</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------</td>
<td>---------------------</td>
<td>--------------</td>
<td>------------------</td>
<td>-------------------------------</td>
<td>-----------------------</td>
<td>---------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>10</td>
<td>Glassman et al., 2001</td>
<td>USA</td>
<td>RCT</td>
<td>100 adults</td>
<td>SCID</td>
<td>57%</td>
<td>All patients had recurrent depression</td>
</tr>
<tr>
<td>11</td>
<td>L. S. Covey et al., 2002</td>
<td>USA</td>
<td>RCT</td>
<td>134 adults</td>
<td>SCID</td>
<td>47%</td>
<td>Those who smoked developed depression (13% vs. 2%), OR 7.17</td>
</tr>
<tr>
<td>12</td>
<td>Cinciripini et al., 2003</td>
<td>USA</td>
<td>RCT</td>
<td>121 adults</td>
<td>Self-report</td>
<td>14%</td>
<td>All patients were recurrent depression</td>
</tr>
<tr>
<td>13</td>
<td>Kahler, Brown, Strong, Lloyd-Richardson, &amp; Niaura, 2003</td>
<td>USA</td>
<td>RCT</td>
<td>435 adults</td>
<td>SCID</td>
<td>19.5%</td>
<td>Depression at baseline inverse to abstinence</td>
</tr>
<tr>
<td>14</td>
<td>Killen, Fortmann, Schatzberg, Hayward, &amp; Varady, 2003</td>
<td>USA</td>
<td>RCT</td>
<td>224 adults</td>
<td>SCID</td>
<td>20%</td>
<td>19.4% of these had recurrent depression</td>
</tr>
<tr>
<td>15</td>
<td>Michele D. Levine, Marcus, &amp; Perkins, 2003</td>
<td>USA</td>
<td>RCT</td>
<td>219 adult women</td>
<td>IDD-L</td>
<td>52.5%</td>
<td>Lifetime history associated with increased cognitive vulnerability to depression</td>
</tr>
<tr>
<td>16</td>
<td>L. Cox et al., 2004</td>
<td>USA</td>
<td>RCT</td>
<td>784 adults</td>
<td>SCID</td>
<td>17%</td>
<td>Lifetime depression associated with increased depressive symptoms</td>
</tr>
<tr>
<td>17</td>
<td>Haas, Munoz, Humfleet, Reus, &amp; Hall, 2004</td>
<td>USA</td>
<td>RCT</td>
<td>549 adults</td>
<td>DIS</td>
<td>28.2%</td>
<td>Those with change in depressive symptoms were more likely to relapse OR 4.88</td>
</tr>
<tr>
<td>18</td>
<td>John et al., 2004</td>
<td>Germany</td>
<td>Longitudinal</td>
<td>4075 adults</td>
<td>CIDI</td>
<td>13%</td>
<td>Those with change in depressive symptoms were more likely to relapse</td>
</tr>
<tr>
<td>19</td>
<td>Killen et al., 2004</td>
<td>USA</td>
<td>RCT</td>
<td>211 adolescents</td>
<td>SCID</td>
<td>11%</td>
<td>No difference in treatment outcome with depression</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Recruitment Country</td>
<td>Study Design</td>
<td>N and Population</td>
<td>Instrument/Measure Depression</td>
<td>Depression Prevalence</td>
<td>Comments/ Predictors</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>-------------------------------</td>
<td>------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>20</td>
<td>Glover, 2005</td>
<td>New Zealand</td>
<td>Focus group interview</td>
<td>130 adult Māori</td>
<td>Self-report</td>
<td>30%</td>
<td>78.1% of those with depression had recurrent history</td>
</tr>
<tr>
<td>21</td>
<td>Johnson &amp; Breslau, 2006</td>
<td>USA</td>
<td>Longitudinal</td>
<td>4858 adults</td>
<td>CIDI</td>
<td>16%</td>
<td>More dependence score and withdrawals increased risk for depression</td>
</tr>
<tr>
<td>22</td>
<td>Brown et al., 2007</td>
<td>USA</td>
<td>RCT</td>
<td>524 adults</td>
<td>SCID</td>
<td>17.6%</td>
<td>No difference in treatment outcome with depression</td>
</tr>
<tr>
<td>23</td>
<td>Japuntich et al., 2007</td>
<td>USA</td>
<td>RCT</td>
<td>677 adults</td>
<td>PRIME-MD</td>
<td>24.1%</td>
<td>-</td>
</tr>
<tr>
<td>24</td>
<td>Spring et al., 2007</td>
<td>USA</td>
<td>RCT</td>
<td>247 adults</td>
<td>SCID</td>
<td>44%</td>
<td>Those with depression, 46.6% reported recurrent</td>
</tr>
<tr>
<td>25</td>
<td>Wiesbeck, 2008</td>
<td>Australia, Brazil, Canada, Finland, Japan, USA</td>
<td>Cross-sectional</td>
<td>1849 adults</td>
<td>WHO/ISBRA Interview Schedule</td>
<td>23.7%</td>
<td>3.1% of these had recurrent depression</td>
</tr>
<tr>
<td>26</td>
<td>Adam M. Leventhal et al., 2009</td>
<td>USA</td>
<td>Cross-sectional</td>
<td>342 adults attending psychiatric outpatients</td>
<td>SCID</td>
<td>20%</td>
<td>Those with history of depression were more likely to relapse early post quit (1 week) than late (6 months)</td>
</tr>
<tr>
<td>27</td>
<td>Schleicher et al., 2009</td>
<td>USA</td>
<td>Cross-sectional</td>
<td>315 undergraduate students</td>
<td>SCID</td>
<td>42.9%</td>
<td>30% of these had recurrent depression. Those with history of depression and using treatment were 3.3 times more likely to relapse</td>
</tr>
<tr>
<td>28</td>
<td>Torres et al., 2010</td>
<td>Residences of 90 countries</td>
<td>Longitudinal</td>
<td>3056 internet users</td>
<td>MDE</td>
<td>18.1%</td>
<td>Current smokers were 2.62 times more likely to have history of depression</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Recruitment Country</td>
<td>Study Design</td>
<td>N and Population</td>
<td>Instrument/ Measure Depression</td>
<td>Depression Prevalence</td>
<td>Comments/ Predictors</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------</td>
<td>---------------------</td>
<td>---------------</td>
<td>------------------</td>
<td>--------------------------------</td>
<td>-----------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>29</td>
<td>Bolam, West, &amp; Gunnell, 2011</td>
<td>UK</td>
<td>Longitudinal</td>
<td>1027 internet users</td>
<td>Self-report</td>
<td>24%</td>
<td>Depressive symptoms increased risk of smoking by 3.42 times</td>
</tr>
</tbody>
</table>
Table 4.3: Current smokers with current diagnosis of depression

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Recruitment Country</th>
<th>Study Design</th>
<th>N and population</th>
<th>Instrument/Measure depression</th>
<th>Depression prevalence Current</th>
<th>Comments/Predictors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>K. Kendler et al., 1993</td>
<td>USA</td>
<td>Co-twin control method</td>
<td>1,566 female twins</td>
<td>SCID</td>
<td>9.8%</td>
<td>Depressives were 4 times more likely to quit smoking</td>
</tr>
<tr>
<td>2</td>
<td>Salive &amp; Blazer, 1993</td>
<td>USA</td>
<td>Longitudinal</td>
<td>3,960 geriatric population</td>
<td>CES-D</td>
<td>11.2%</td>
<td>Depression group had higher FTND and withdrawal</td>
</tr>
<tr>
<td>3</td>
<td>Kinnunen, Doherty, Militello, &amp; Garvey, 1996</td>
<td>USA</td>
<td>RCT</td>
<td>269 adults</td>
<td>CES-D</td>
<td>34.3%</td>
<td>Depression related to lower self-efficacy but depression also increased motivation to quit</td>
</tr>
<tr>
<td>4</td>
<td>Haukkala, Uutela, Vartiainen, McAlister, &amp; Knekt, 2000</td>
<td>Finland</td>
<td>Cross-sectional</td>
<td>2,280 adults</td>
<td>BDI</td>
<td>M: 10% F: 5%</td>
<td>Regular smoking increased depression 1.4 times</td>
</tr>
<tr>
<td>5</td>
<td>Johnson &amp; Breslau, 2006</td>
<td>USA</td>
<td>Longitudinal</td>
<td>4,858 adults</td>
<td>CIDI</td>
<td>5%</td>
<td>Depressive symptoms were higher among males that continued to smoke than among former and non-smokers. Depression did not impact quitting</td>
</tr>
<tr>
<td>6</td>
<td>Kinnunen et al., 2006</td>
<td>USA</td>
<td>Longitudinal</td>
<td>2,280 adults male</td>
<td>CMI</td>
<td>2%</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Japuntich et al., 2007</td>
<td>USA</td>
<td>RC</td>
<td>677 adults</td>
<td>PRIME-MD</td>
<td>10.5%</td>
<td>No difference in success rate between depressed and non-depressed using NR</td>
</tr>
<tr>
<td>8</td>
<td>Kinnunen, Korhonen, Tellervo, &amp; Garvey, 2008</td>
<td>USA</td>
<td>RCT</td>
<td>608 adults</td>
<td>CES-D</td>
<td>32%</td>
<td>High rate of people with mental illness attending quit clinics</td>
</tr>
<tr>
<td>No.</td>
<td>Name</td>
<td>Recruitment Country</td>
<td>Study Design</td>
<td>N and population</td>
<td>Instrument/Measure depression</td>
<td>Depression prevalence Current</td>
<td>Comments/Predictors</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>------------------</td>
<td>-------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>9</td>
<td>Aguiar et al., 2009</td>
<td>Portugal</td>
<td>Longitudinal</td>
<td>526 adults attending quit clinic</td>
<td>Not stated</td>
<td>21.5%</td>
<td>Quit rates lower in those with increasing depression withdrawal expectancy scores</td>
</tr>
<tr>
<td>10</td>
<td>Copeland, Kulesza, &amp; Hecht, 2009</td>
<td>USA</td>
<td>Cross-sectional</td>
<td>39 college students</td>
<td>BDI</td>
<td>29%</td>
<td>Depressed smokers were 2 times more likely to be nicotine dependent</td>
</tr>
<tr>
<td>11</td>
<td>Khaled et al., 2009</td>
<td>Canada</td>
<td>Longitudinal</td>
<td>11,727 adults</td>
<td>CIDI</td>
<td>10.6%</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>Leventhal et al., 2009</td>
<td>USA</td>
<td>Cross-sectional</td>
<td>342 adults</td>
<td>SCID</td>
<td>57.8%</td>
<td>Those with depression were least likely to quit</td>
</tr>
<tr>
<td>13</td>
<td>Hebert, Cummins, Hernández, Tedeschi, &amp; Zhu, 2011</td>
<td>USA</td>
<td>Longitudinal</td>
<td>844 adult using Quitline</td>
<td>PHQ-9</td>
<td>24.2%</td>
<td>Smoking associated with depression particularly female OR 3.72</td>
</tr>
<tr>
<td>14</td>
<td>Yun, Shin, Kweon, Ryu, &amp; Rhee, 2012</td>
<td>Korea</td>
<td>Cross-sectional</td>
<td>20,084 adults general population</td>
<td>CES-D</td>
<td>M: 4.6% F: 8%</td>
<td>-</td>
</tr>
</tbody>
</table>
4.3.2 Causality

There is still uncertainty and disagreement over the relationship between smoking and depression in terms of causality. Four hypotheses for causality were often reported in the literature: a) depression causes smoking, b) smoking causes depression, c) there is no relationship between the two i.e. other factors were involved, and d) the relationship is bi-directional. A fifth, more likely restricted to adolescent causality, postulates that depression is divided into subgroups and each group has a different relationship with smoking.

a) Depression causes smoking

This hypothesis has often been referred to as the ‘self-medication hypotheses’ (Markou, Kosten, & Koob, 1998). It suggests that individuals use substances to overcome or ‘treat’ an underlying condition. It has been commonly viewed as a motive to initiate drugs of abuse and dependence. Causality is supported by the high prevalence of lifetime depression among current smokers as seen in Table 4.2. These smokers are believed to smoke in order to alleviate their depression through a shared neurobiological mechanism (Laje, Berman, & Glassman, 2001; Markou et al., 1998).

During depression, the impaired MAO system leads to a reduction in neurotransmitters such as serotonin, noradrenaline and dopamine (Hamon & Blier, 2013). Tobacco use leads to the opposite, the release of these needed neurotransmitters either through nicotine or other ‘toxins’ (Eriksen et al., 2012; Henningfield, 1995). In turn, it is thought this relationship regulates the chemical imbalance associated with depression. Smokers are compelled to continue smoking in order to maintain mood regulation and therefore continue to become dependent as a result.

b) Smoking causes depression

The second hypothesis posits that smoking causes depression. Chronic use of tobacco is thought to cause changes in the brain and lead to the development of depression (Breese et al., 1997). The earlier the individual starts smoking tobacco, the greater the risk as a result of the longer duration of exposure to the ‘toxins’ of tobacco smoking (Murphy, Horton, Monson, & Laird, 2003). Early smoking initiation is also associated with a higher likelihood of dependence and increasing difficulties for smoking cessation. Smokers in this category reported more severe withdrawal
symptoms on smoking cessation. Frequent withdrawal symptoms on the other hand are implicated to cause further impairment (Covey, Glassman, & Stetner, 1997; John et al., 2004; Laje et al., 2001). Longitudinal studies, including those following birth cohorts to adulthood or amongst adults followed over a period of time, reported a link between smoking and developing depression (Breslau, Kilbey, & Andreski, 1991; Brown et al., 1996; Fergusson et al., 2003; Pedersen & Von Soest, 2009; Wu & Anthony, 1999). Building on their previous work using the CDHS data (Fergusson et al., 2003), Boden et al., (2010) analysed data at the time point of 24 years of their longitudinal cohort and reported further evidence to support their position that smoking causes depression (B=0.18, S.E. = 0.05, p<0.001). Jamal, Van der Does, Penninx, and Cuijpers (2011) also found that early smoking onset might reduce the time to first depression. This study found that those smoking earlier were diagnosed with depression five years earlier than late onset-smokers. Therefore, the authors concluded that the earlier an individual started smoking the shorter the onset to developing depression.

c) There is no relationship between the two

A third hypothesis asserts that causality was the result of a third variable, a confounder which could include either a genetic or an environmental cause. Kendler et al. (1993), using their co-twin study consisting of 1566 twins (415 monozygotic, 315 dizygotic) from the Virginia twin registry, demonstrated through co-twin control analysis that causality was most likely genetic. This study was supported by another study looking at genetic probands which also reported a possible common cause. Using data from 979 epidemiological cohort participants, Johnson, Rhee, Chase, and Breslau (2004) reported familial correlation of 75-93% of these participants. Other researchers had not found similar findings and the authors attributed their findings to differences in definition and method of analysis. An examination of Tables 4.2 and 4.3 indicates differences in the definition of depression using a variety of measurement instruments. In their pioneering study, Audrain-McGovern, Lerman, Wileyto, Rodriguez, and Shields (2004), reported the possibility of the DRD2A1 allele role found in smokers as a possible explanation. They postulated that this gene, the DRD2A1 allele, might be activated by depression and therefore lead to increasing smoking levels amongst those already smoking. Meanwhile, Chaiton and Zhang (2007), using the Ontario Student Drug Use Survey, reported the possibility of environmental factors as the confounder. A major limitation of this study was the
cross-sectional design which was unsuitable to show causality. Holma, Holma, Melartin, Ketokivi, and Isometsä (2013), nevertheless, reported smoking to be strongly associated with alcohol use and personality traits, especially in samples already depressed. This study, using the Vantaa Depression study, included 214 participants recruited from both out-patient and in-patient psychiatric services. Therefore, the findings might be implicated for a higher risk population as opposed to the general population.

d) The relationship is bi-directional

More recent work using longitudinal study designs have supported the bi-directional causation. Earlier hypotheses engaging in a unilateral direction to test causality appeared incomplete by not incorporating the possibility of both arguments for causality. In a systematic review investigating longitudinal studies over nearly two decades, Chaiton, Cohen, O'Loughlin, and Rehm (2009) reported the onset of smoking among a non-clinical sample was found to be bi-directional especially in those using clinical measures. An explanation for a bi-directional approach might well be the interplay between tobacco smoking causing neurobiological changes within the developing brain. These changes ironically require tobacco use to regulate once the damage has set in. Therefore, studies at a particular time point might provide only half the explanation. In support of this, others have found an independent association between depression and smoking and vice versa which might explain the bi-directionality (Holma et al., 2013). Also, bi-directionality for causation was supported in the relationship between poor mental health in general and smoking (Leung, Gartner, Hall, Lucke, & Dobson, 2012).

Park and Romer (2007) reported the fifth hypothesis on causality from the work of Rodriguez, Moss, and Audrain-McGovern (2005). To our knowledge this has not been reported elsewhere. In their review, Park and Romer (2007) have elegantly summarised the relationship between depression and smoking as not being static across timelines, but rather as dynamic at different periods and at different levels of symptomatology (mild, moderate and severe). There appear to be similarities with the fourth hypothesis, the difference being that Rodriguez et al. (2005), studied depression using subtypes as opposed to a single entity. This study caveated limitations to restrict their findings to an adolescent aetiology for causality.
In summary, it is still not clear as to the exact mechanism of the relationship between depression and smoking. Nonetheless, there appears to be an inclination for a bi-directional explanation to support this causal relationship.

### 4.4 Depression and Smoking Cessation

There were fourteen reviews on this topic (Table 4.4); seven were from the United States, three from Australia, two from Europe and one each from the United Kingdom and Sweden. All were published in the last ten years. Four attempted a systematic review (Fagerström & Aubin, 2009; Gierisch, 2012; Hitsman et al., 2003; John R. Hughes, 2007a) and of these, two provided a meta-analysis (Gierisch, 2012; Hitsman et al., 2003). All articles provided advice on managing smoking in those with depression; however, only two scrutinised the evidence and provided a conclusion (Gierisch, 2012; Hitsman et al., 2003). One systematic review examined the incidence of developing depression on smoking cessation (Hughes, 2007a), and one other provided guidance for future developments within the field (Wilhelm, Wedgewood, Niven, & Kay-Lambskin, 2006).

The meta-analysis by Hitsman et al. (2003), was the earliest review investigating the association of lifetime depression and smoking cessation outcomes. Using data up until 2000, they found only 15 studies at the time, the majority of which were clinical samples. They concluded that there was no association between a history of depression and smoking cessation in both the short (≤ 3 months) and long term (≥ 6 months), or between genders. These findings created much discussion at the time (Covey, 2004; Hall, 2004; Hitsman, Spring, Borrelli, McChargue, & Niaura, 2004). Covey, Andrew Bomback, and Yan (2006), reported that a recurrent history of depression, as opposed to a single history of depression, might be associated with poor cessation outcomes. Hitsman et al., (2013) recently conducted a re-analysis on their previous publication (Hitsman et al., 2003) using updated studies until 2009. This study reported a small but modest effect of lifetime depression and reduced abstinence on short term cessation (17%) OR 0.83 CI (0.72-0.95, p = 0.009) and long term cessation (19%) OR 0.81 CI (0.67-0.91, p = 0.023). The researchers, however, did not include the sole varenicline study in their final analysis due to the antidepressant properties of the medication.

Current understanding is based on information from clinical trials rather than naturalistic, observational and cohort studies (Ziedonis et al., 2008). The latter three
types of study have appeared less frequently in the literature. Moreover, Gierisch (2012), reported using only RCTs in her analysis of 16 studies. This review also reported insufficient studies to examine gender and current depression moderators, and thus was only able to answer one of her three research questions. These reviews highlighted the lack of studies involving current depression, although newer studies were more inclusive. These meta-analyses (Gierisch, 2012; Hitsman et al., 2003; Hitsman et al., 2013) also reported smoking cessation outcomes in those with lifetime depression as opposed to current depression due to the lack of studies.

The over-representation of clinical studies meant that findings were not as generalizable to the general population. Often, clinical studies included the more difficult to treat patients and had definitive inclusion criteria which might not represent the general population. This group is often referred to as ‘hardened’ smokers (Warner & Burns, 2003) although there are mixed reports on this theory. A study in Australia (Gartner, Scollo, Marquart, Mathews, & Hall, 2012) using three national surveys with > 50,000 participants found little to suggest a hardening hypothesis despite a falling smoking rate over a 7 to 10 year period. The analysis conducted on those from disadvantaged circumstances i.e. lower socioeconomic background, presence of psychological distress did not find any change between the two time points. Nevertheless, the hardening hypothesis maintained that remaining smokers were more addicted to nicotine and therefore harder to treat. This group was also considered by some to be a reason why prevalence has plateaued, especially in developed countries. It is thought that current policies have targeted the general population well, but have missed out on a certain segment of the population, who have more needs in their dependence to nicotine (Costa et al., 2010; Hughes, 2011; Ip et al., 2012).
<table>
<thead>
<tr>
<th>No.</th>
<th>Authors</th>
<th>Year (published)</th>
<th>Country of Origin</th>
<th>Date range of articles</th>
<th>Aim of Review</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>(Hitsman et al.)</td>
<td>2003</td>
<td>USA</td>
<td>1966-2000</td>
<td>Meta-analysis to evaluate a history of depression is associated with failure to quit smoking, and to investigate factors that moderate the relationship between a history of depression and cessation outcomes</td>
</tr>
<tr>
<td>2.</td>
<td>(Paperwalla, Levin, Weiner, &amp; Saravay)</td>
<td>2004</td>
<td>USA</td>
<td>NS</td>
<td>Review of the interaction between smoking and depression, focussing on biological and behavioural research</td>
</tr>
<tr>
<td>3.</td>
<td>(Wilhelm, Arnold, Niven, &amp; Richmond)</td>
<td>2004</td>
<td>Australia</td>
<td>NS</td>
<td>Overview of the relationship between depression and smoking.; andto provide recommendations on how to treat these individuals</td>
</tr>
<tr>
<td>4.</td>
<td>(Wilhelm et al.)</td>
<td>2006</td>
<td>Australia</td>
<td>NS</td>
<td>Review research on the association between smoking cessation and depression, emphasising future research</td>
</tr>
<tr>
<td>5.</td>
<td>(Morrell &amp; Cohen)</td>
<td>2006</td>
<td>USA</td>
<td>NS</td>
<td>Review of anxiety and depression as they relate to stages of the cigarette smoking cycle</td>
</tr>
<tr>
<td>6.</td>
<td>(John R. Hughes)</td>
<td>2007</td>
<td>USA</td>
<td>1990-2004</td>
<td>To test whether the incidence of depression after smoking is greater than expected</td>
</tr>
<tr>
<td>7.</td>
<td>(Lembke, Johnson, &amp; DeBattista)</td>
<td>2007</td>
<td>USA</td>
<td>NS</td>
<td>Review of the clinical evidence on depression and smoking cessation, and support for current psychiatric practices</td>
</tr>
<tr>
<td>8.</td>
<td>(Ziedonis et al.)</td>
<td>2008</td>
<td>USA</td>
<td>NS</td>
<td>Review of tobacco use. dependence and smoking cessation among those with mental illness especially anxiety disorder, depression and schizophrenia</td>
</tr>
<tr>
<td>9.</td>
<td>(Campion)</td>
<td>2008</td>
<td>UK</td>
<td>NS</td>
<td>Review of literature on smoking cessation in those with mental health problems with the emphasis on depression and schizophrenia</td>
</tr>
<tr>
<td>No.</td>
<td>Authors</td>
<td>Year (published)</td>
<td>Country of Origin</td>
<td>Date range of articles</td>
<td>Aim of Review</td>
</tr>
<tr>
<td>-----</td>
<td>--------------------------</td>
<td>------------------</td>
<td>-------------------</td>
<td>------------------------</td>
<td>--------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>10.</td>
<td>(Ischaki &amp; Gratziou)</td>
<td>2009</td>
<td>Greece</td>
<td>NS</td>
<td>Review of the relationship between smoking and depression, the influence of depression and smoking cessation trials, and the available treatment for this group</td>
</tr>
<tr>
<td>11.</td>
<td>(Fagerström &amp; Aubin)</td>
<td>2009</td>
<td>Sweden</td>
<td>1990-2008</td>
<td>Review of the relationship between smoking and psychiatric disorder, emphasising depression and schizophrenia</td>
</tr>
<tr>
<td>12.</td>
<td>(Molina-Linde)</td>
<td>2011</td>
<td>Spain</td>
<td>NS</td>
<td>Review of effective strategies for smoking cessation to assist adults with depression, schizophrenia and psychosis</td>
</tr>
<tr>
<td>13</td>
<td>(Gierisch)</td>
<td>2011</td>
<td>USA</td>
<td>Till 2010</td>
<td>Systematic review of smoking cessation interventions for patients with history of depression or current depressive symptoms</td>
</tr>
<tr>
<td>14</td>
<td>(Mendelsohn)</td>
<td>2012</td>
<td>Australia</td>
<td>NS</td>
<td>Review of the relationship between smoking and depression, and the evidence on certain treatments used in general practice</td>
</tr>
</tbody>
</table>
4.5 Relationship between Depression and Smoking Cessation

4.5.1 Do People with Depression Want to Quit Smoking?

One of the explanations for the reluctance to treat smokers with mental illness is the notion that these smokers are unwilling and do not want to quit (Prochaska, 2011). This reluctance also extends to those with depression. There appears to be little evidence that depression is worsened by smoking cessation and, since a greater number of them are at risk for tobacco related harm, it is considered that every effort should be made to assist them to quit smoking (Ministry of Health, 2007; Tobacco Use and Dependence Guideline Panel, 2008). The benefits for smoking cessation has been estimated to outweigh the risk of harm that is, if there is even any risk of harm to begin with (U.S. Department of Health and Human Services, 1990).

Evidence from the National Institute Health Survey of 23,393 non-institutionalised adults in the US revealed that those with mental illness were as likely as those without to attempt smoking cessation (45.9% vs. 41.8%), although having more than one mental illness might reduce the likelihood to do so (Ziedonis et al., 2008). In their longitudinal study of 25 years, Kinnunen et al. (2006) reported that those with higher depressive scores were as likely to quit as those with lower scores. Another study of 844 callers to Quitline identified that 40.7% of these callers who had symptoms suggestive of mild to major depression nonetheless also utilised the Quitline service to assist in their quitting (Hebert, Cummins, Hernández, Tedeschi, & Zhu, 2011). The findings from this observational study provided a glimpse of service utilisation for those with depression in the community. A more recent study with nearly 8000 participants, where half were mental health patients with depression, provides further evidence of quit smoking attempts made by this population (Anthenelli et al., 2016). Therefore, there are indications that those with depression in the community are as likely to use smoking cessation services when available.

From the available literature outline, there is evidence to suggest that people with depression are also willing to quit smoking using both clinical and community settings, irrespective of their depression status.

4.5.2 Does Depression Influence Outcomes for Smoking Cessation?

Current understanding is based on data from clinical settings as opposed to community or epidemiological settings (Gierisch, 2012). The current understanding
on how depression interacts with smoking cessation outcomes is restricted to lifetime rather than current depression (Gierisch, 2012; Hitsman et al., 2013). Therefore, there is a need for more research, particularly in naturalistic studies, as the information on the impact of depression on smoking cessation is still unclear.

The study by Glassman et al., (1988) was one of the early studies reporting a negative effect of lifetime depression on smoking cessation. Following this, the same authors conducted a test of association using participants of the St Louise Epidemiological Catchment Area Study (n = 3213) and found that those with lifetime depression were less likely to succeed in smoking cessation compared to those without (31% vs. 14%). Others have not found any significance in this relationship, especially for long term outcomes (Ginsberg, Hall, Reus, & Muñoz, 1995; Niaura et al., 1999). A meta-analysis of 15 publications found no association between lifetime depression and smoking cessation (Hitsman et al., 2003). A recent update, however, has reported modest negative association in both short (n = 35, OR = 0.83, 95% CI = 0.72–0.95, P = 0.009) and long term outcomes (n = 38, OR = 0.81, 95% CI = 0.67–0.97, P = 0.023) (Hitsman et al., 2013). Therefore, this most recent review suggests that the presence of lifetime depression is associated with poorer smoking cessation outcomes. This meta-analysis included 42 publications, including the previous 15, and analysis conducted excluded smoking cessation treatments which might have antidepressant effects, but still found the findings to be robust.

The relationship between current depression and smoking cessation has been the subject of even fewer studies (Gierisch, 2012; Hitsman et al., 2003; Hitsman et al., 2013; Wilhelm et al., 2006). One of the earlier studies investigating current depression and smoking cessation used a nationally representative survey (National Health and Nutrition Examination Survey, NHANES). In this study, Anda et al. (1990), defined depression using the CES-D (cut-off score ≥16) and found that those with depression were 40% more likely to fail in their quit attempt compared to those without depression (p<0.05). Another study of 296 participants found that those with depression were unlikely to abstain at 1 week compared to those without depression (37% vs. 56%). At 3 months, those with depression and on placebo fared the worst: only 12.5% of them managed to quit smoking. The results for those with depression and using NRT gum were similar to those without depression and on placebo (29.5% vs. 24.1%, p = 0.36). Those without depression and NRT did the best (37%). Overall, those who were non-depressed on active NRT gum did better than those who were
non-depressed and on placebo, or those who were depressed using active NRT gum (p<0.05) (Kinnunen, Doherty, Militello, & Garvey, 1996). This study, however, did not mention retention rate at 3-months which might have affected the outcome. In a meta-analysis of smoking cessation interventions of patients with depression (Gierisch, 2012), only three (Hall et al., 2006; MacPherson et al., 2010; Vickers et al., 2009) of 16 articles were full RCTs which investigated current depression and smoking cessation. These were also the three of 49 articles identified in a recent Cochrane review (van der Meer, Willemsen, Smit, & Cuijpers, 2013). In this review which favoured abstinence outcomes of six months or longer, adding psychosocial interventions assisted current smoking cessation intervention in those with current and a history of depression. On their own, smoking cessation aids bupropion, RR 1.37 CI (0.83 to 2.27) and NRTs RR 1.17 CI (0.85 to 1.60) showed positive results in treating those with current depression but the results are not statistically significant. There have not been enough studies evaluating the outcomes of smoking amongst people with current depression to provide a more conclusive result.

A longitudinal study over 25 years, involving 2208 men recruited from the Veterans Administration Normative Aging Study, measured depression using three measures. None were found to be associated with reduced likelihood for smoking cessation. Also, the symptoms of those who were reported to have higher depressive symptoms over time did not appear to have an impact on their smoking cessation (Kinnunen et al., 2006). This was in contrast to Killen, Fortmann, Schatzberg, Hayward, and Varady (2003), which reported increasing symptoms of depression using the CES-D which was associated with lower likelihood of abstinence over a 26 week period.

Therefore, it appears from the available literature that lifetime depression is associated with a poorer outcome, but there has not been enough research to confidently come to the same conclusion for those with current depression.

4.5.3 Does Smoking Cessation Worsen Depression?

Relapse of the underlying psychiatric symptoms is another common concern expressed by those reluctant to treat smokers with mental illness (Prochaska, 2011). One of the earlier studies (Covey et al., 1997) included 126 participants who had completed a previous smoking cessation clinical trial and were followed up at 3-months. Participants were abstinent and not depressed on recruitment. At follow-up, using DSM-IIR for assessment, the incidence of depression was 2% for those without
a history of depression, 17% for those with a previous single history, and 30% for those with recurrent history. Those with a history of depression, especially recurrent depression (p=0.008) and persistent withdrawal symptoms, were at greater risk (p<0.05) of developing a new episode of depression. Using a similar follow-up design, but at 6-months, participants in a clinical trial for smoking cessation using sertraline reported a higher incidence of depression in those who were abstainers compared to continued smokers, 31% vs. 2% (p=0.008) (Glassman et al., 2001). This study, however, did not follow-up on dropouts of the study (n=24) and had a small initial sample size (n=100). Dropouts were also more likely to continue smoking and this might affect the incidence of new depression at 6-months. Tsoh et al. (2000), using two trials for smoking cessation (n=304), also looked at the incidence of new depression using the Inventory to Diagnose Depression, a self-report questionnaire based on the DSM-III-R. They found a 14.1% incidence of depression at 12-months follow-up, and there was no significant difference between those who were abstinent or continued smoking. Similar to findings by Covey et al. (1997), those with a history of depression were more likely to develop a subsequent episode. However, unlike Covey et al. (1997), those with a history of recurrent depression were not at greater risk. Using another study on smoking cessation, comparing NRT with paroxetine (20mg and 40mg) against NRT alone, Killen et al., (2003) reported a depression incidence of 4% (10/224) using the Structural Clinical Interview for DSM-IV (SCID). Of the ten participants, 80% resumed smoking at the end of treatment at 26 weeks and of these, two had a history of lifetime depression. In a study of adolescents, with a mean age 17, the incidence for depression was 1% (2/211) using the SCID. The authors concluded that incidences were similar in both adolescents and adults and therefore warranted awareness. In this study, however, only one of the two had a history of previous depression (Killen et al., 2004). A review of seven clinical studies, however, did not conclude that abstainers were more likely to develop new onset depression (Hughes, 2007a).

Although clinical studies have found new incidences of depression post smoking cessation, there have been no similar findings from community based studies. The limited studies available have not reported smoking cessation to worsen depression. In the ATTEMPT cohort, a longitudinal study recruiting community samples from the internet (n=3645), an analysis of 1027 of them, who were free from depression at baseline, found no difference in depression symptoms at 6 to 9 months between those who were abstinent and those who continued to smoke OR= 1.03 CI (0.41 to
2.56) (Bolam, West, & Gunnell, 2011). Another analysis conducted using the same data set, but comparing those who quit for at least 3-months or less than 3-months at the 12-month follow-up, found a similar conclusion whereby quitting smoking was not associated with an increase in depression but might actually instead have reduced it (Shahab, Andrew, & West, 2013). Both studies used the internet to recruit participants and therefore depression was assessed by self-report using single statement questions on depression over the past 30 days; this may have limited finding validity.

Therefore, from the literature reviewed, there was little evidence of their being a risk of developing depression after quitting smoking in those in clinical samples without recurrent depression or severe withdrawal symptoms. Similarly for those in community samples, there was little evidence to suggest quitting smoking increases the risk of depression.

### 4.5.4 Depression Predicting Smoking Cessation

In two studies elucidated to earlier (Covey et al., 1997; Tsoh et al., 2000), although a history of depression was predictive of new onset depression, those with recurrent depression were at even greater risk. Recurrent depression has been associated with higher levels of nicotine dependence. Increased dependence has been shown to affect outcomes negatively. In their secondary analysis of 179 participants attending a smoking cessation study, Cohn, Strong, Abrantes, and Brown (2010) reported those with recurrent depression to be associated also with reduced self-efficacy. Also, their analysis found those with recurrent depression were more unlikely to be abstinent on their quit day (OR = 4.44, P<0.05). The authors, however, did not find an increased risk for early relapse amongst those with recurrent depression (β=0.45, p>0.05). Strong et al. (2010), in their study of 1560 participants, reported that those with recurrent depression also had a reduced number of quit attempts compared to those with single episode or no history of depression. The main limitation of this study, however, was the cross-sectional design.

A recent review, looking at all published articles on smokers with depression and smoking cessation identified 190 articles and concluded that there was still much work to do in understanding this relationship between depression and smoking cessation (Weinberger, Mazure, Morlett, & McKee, 2013). There has been little research on current depression, and even less on dysthymia and minor depression.
Minor depression has been associated with similar burden as MDD (Pietrzak et al., 2013). Increasing symptoms of depression, but not necessarily meeting full criteria, have been found to affect outcomes (Killen et al., 2003) and this, too, is a potential area of study.

There is one other published study looking at predictors of depression in New Zealand. This used secondary data from an RCT on NRT (Williman, Parag, Walker, & Bullen, 2011). The authors reported that those with lifetime depression at baseline were more likely to be depressed at six months; however, those who managed to abstain for the duration were noted to have fewer symptoms. This study, however, was not primarily designed to investigate this matter.

4.6 Summary

Depression is a serious medical illness which was initially believed to be associated with smoking and to complicate smoking cessation. Available studies, have found that the relationship between depression and smoking is still inconclusive. There is, however, increasing evidence that the causal relationship between depression and smoking may be bi-directional in nature whereby depression can lead to smoking and continuous smoking may precipitate depression.

Most of the current information on depression in relation to smoking is related to lifetime depression rather than current depression. Information on depression and smoking cessation, however, is mainly limited to clinical trial settings as opposed to the community, and may limit the findings. Similarly, there is little information to show that smoking cessation leads to new incidence of depression and what information there is was obtained from clinical settings as opposed to community based settings. Nevertheless, one recognised predictor of future depression during smoking cessation was a history of recurrent depression.

Although there are a number of studies investigating the relationship between depression and smoking, and depression and smoking cessation, these studies have their limitations. There is still an opportunity to revisit this relationship and provide more information to the current pool of knowledge.
CHAPTER 5 - Literature Review: Smoking Cessation and Weight Gain

5.1 Chapter Overview

This chapter will investigate the role of weight gain and obesity and its relationship to smoking and smoking cessation. Mechanisms for weight gain on quitting smoking will be addressed and treatments to prevent or reduce the weight gained will be reviewed. The chapter will end with a review of available studies conducted in New Zealand, before ending with the research gaps in this area of interest.

5.2 The Obesity Epidemic

Obesity is defined by the WHO as abnormal or excessive accumulation of fat which impairs health (James, Leach, Kalamara, & Shayeghi, 2001). Obesity has also been reported as overweight grade 2 (WHO Expert Committee, 1995). Both definitions can be measured by using the body mass index (BMI), which is represented by the formula current weight in kilograms divided by the square of current height in meters (kg/m\(^2\)). Those with a body mass index of equal to or greater than 25 are considered overweight and those equal to or greater than 30 are obese. However, variability between ethnicities has also been considered. An alternative BMI scoring for Asians has been published with lower cut-offs scores (James et al., 2001).

The consequences of being overweight and obese are major risk factors for various health conditions, including increasing the risk of developing diabetes, various cardiovascular diseases and also cancer (Hedley et al., 2004). The WHO estimates that three million lives are lost yearly as a result of obesity (Consultation, 2000). Compared to individuals of normal weight, those with obesity have shorter life spans. Obese individuals have been reported to die 13 years earlier than those who are not obese (Fontaine, Redden, Wang, Westfall, & Allison, 2003; Peeters et al., 2003).

The past four decades have recorded a noticeable increase in worldwide obesity. It affects both high income countries and lower middle income countries. However, it is increasingly being recognised as a problem of high income countries, but more noticeably affecting the poor within these countries (James et al., 2001). It is projected that by 2030, obesity will affect an estimated 576 million people compared to 396 million in 2005 (Kelly, Yang, Chen, Reynolds, & He, 2008). In 2008, however, it was already estimated that 502 million people were considered to be obese.
(Swinburn et al., 2011). Others have reported the obesity rates to have increased by 1% each year in the countries surveyed, making statistics meaningless rather quickly as national databases need to be updated regularly to reduce the risk of being obsolete and unable to cater to the current required demands in both policies and treatment practices (Prentice, 2006).

5.2.1 How is the Obesity Epidemic Related to Tobacco?

Amongst the reported withdrawal symptoms of nicotine dependence is increased appetite and/or weight gain. Some researchers have postulated that the cost of population level smoking cessation has contributed towards the current obesity situation. An early study by Chou, Grossman, and Saffer (2004), reported trends from the National Health Examination Survey (NHES) and NHANES I,II,III and 99 which clearly showed an increasing trend in BMI from 24.91 in the late 1950s to 27.85 in 2000. This was accompanied by an increasing proportion of obesity from 12% to nearly 30% during the same time. At the same time as the prevalence of obesity was climbing, smoking rates were dropping. This was postulated most likely as a consequence of the 1964 US Surgeon General’s report on the dangers of cigarettes released during that time period. Chou et al. (2004), using repeated cross-sections of the Behavioural Risk Factor Surveillance System (BRFSS) data for the years 1984-1999, found a positive correlation between increasing cigarette prices and increasing obesity. However, the authors also stated a caveat that, despite their positive findings, cigarette prices were actually similar for the two decades from 1960s to 1978 without any spike in obesity during that period. Nonnemaker, Finkelstein, Engelen, Hoerger, and Farrelly (2009) replicated the study by Chou et al. (2004) using the BRFSS, but divided smokers into current smokers, former smokers and non-smokers. They found that the largest BMI change was in the non-smoker group compared to the other groups; however, this observation was not significant (p>0.05). When analysed further, the authors found further discrepancies and concluded there was no support for the claim of increasing cigarette taxes causing the obesity rise. In another study using the NHANES 99 dataset for both weight and smoking, Flegal (2007) reported a very small effect of less than 1% of the role of smoking cessation on the population level rise in obesity. Similarly, Kasteridis and Yen (2012) in their study also found that if there was any effect of smoking cessation on the obesity epidemic, it probably was very modest. All these studies have indicated that smoking cessation may lead to obesity, although at the population level this rise was most
likely negligible. There are likely other factors involved unrelated to smoking cessation, such as the reduction in processing one’s own food and the rise of restaurants, particularly fast food outlets, during the same period (Chou et al., 2004).

5.3 Weight and Smoking

5.3.1 The Relationship between Smoking and Weight

Weight control is amongst the more commonly cited reasons for initiating and continuing smoking, and a significant reason cited for finding it difficult to quit smoking (Borrelli & Mermelstein, 1998; Pomerleau & Kurth, 1996; Pomerleau, Zucker, & Steward, 2001). The fear of weight gain was reported by both men and women alike (Larsen et al., 2009). However, more women than men endorsed weight control as a reason to start smoking (Spring et al., 2009). Similarly, this was also found among adolescents as a reason to continue smoking (Larsen et al., 2009). More women than men also increasingly used smoking as an appetite suppressant. These participants reported smoking assisted them to control their eating and that smoking cessation led to an increase in weight (French & Jeffery, 1995). Pomerleau and Kurth (1996) reported that among the 87 women studied, younger women in their study were more likely to report not wanting to gain any weight compared to senior women (57% vs. 9%). Of those who reported being willing for any weight gain, they were found to be only agreeable for a gain of less than 2.3kg (75%). Post-cessation weight gain was also reported as the main reason for half of women not wanting to quit smoking. In the same study, just over a quarter (26%) of the men reported not wanting to quit due to post-cessation weight gain (Clark et al., 2006). Recent work by Siahpush et al. (2013) reported that in spite of weight gain, the benefits of quitting for health outweighs the consequences to health as a result of weight gain. The findings by Siahpush et al., (2013) provided further reassurance on the benefits of quitting.

5.3.2 Mechanism of Smoking in Weight Control

The relationship between smoking and weight is complex and multi-factorial. The actual mechanism of action for tobacco smoking to control weight is still not yet fully understood. Studies have consistently reported smokers having lower BMIs compared to both recent quitters and also former smokers (Audrain-McGovern & Benowitz, 2011). There is increasing evidence to support the actions of nicotine in tobacco as an important factor in weight control (Audrain-McGovern & Benowitz,
Nicotine has been shown to assist in weight control, mainly through two mechanisms: 1) increasing resting metabolic rate or thermogenesis and 2) reducing appetite.

Nicotine acts by binding to nicotine acetylcholine receptors (nAchR). This action results in the release of various neurotransmitters such as dopamine, serotonin and noradrenaline. It is the latter which is believed to be responsible for the increase in resting metabolic rate (Jarvik, 1991). In a study by Perkins, Epstein, Still, Marks, and Jacob (1989), acute nicotine use has been shown to increase resting metabolic rate above baseline by 6% compared to 3% in placebo. This study, using zero, low and moderate nicotine preparations administered through a nasal spray, was designed to separate nicotine action on resting metabolic rate from the action of smoking itself. The findings of an increase in resting metabolic rate by placebo means that there is still some interaction through the administration of nicotine.

The role of nicotine in reducing appetite is more complex. The melanocortin system (MC) within the brainstem, the role of the MC4 receptor in particular, has been implicated in regulating appetite (Seeley & Sandoval, 2011). The pro-opiomelanocortin (POMC) neurons located in the central nervous system at the hypothalamus are responsible for synthesising several molecules which act on the MC4 (Schwartz, Woods, Porte, Seeley, & Baskin, 2000). Action on the MC4 produces appetite suppression.

Nicotine interacts with the POMC through a number of systems as shown in Figure 1. Indirectly, acute nicotine intake has been shown to increase ghrelin, one of two hormones implicated in appetite regulation (Cowley et al., 2001; Rubinstein & Low, 2011). Ghrelin particularly interacts with neuropeptide-Y (NPY), a neurotransmitter associated with inhibiting the actions of POMC. Through the action of ghrelin, the inhibitory role of NPY is disrupted and therefore POMC is able to increase its action. Nicotine has also been shown to increase leptin, another hormone involved with regulating appetite (Cowley et al., 2001). Leptin binds to receptors at the POMC to stimulate its action leading to appetite suppression.

Apart from nicotine’s action on hormones, it is also involved in the release of serotonin (Pomerleau, Pomerleau, Morrell, & Lowenbergh, 1991). Similar to the actions of leptin, serotonin binds to serotonin receptors at the POMC to increase MC4 binding molecules. Recently, Mineur et al. (2011) reported on the direct
relationship between nicotine and the POMC. Nicotine was shown to bind with the α2β3 receptor which was shown to stimulate the POMC directly. This study was unique in that it incorporated a number of methodologies to come to the researchers’ conclusion. These studies were, however, conducted mainly on rats and, although they gave an indication of the mechanism of nicotine’s action towards appetite, this might not easily be translated in the clinical setting. Kroemer, Guevara, Vollstädt-Klein, and Smolka (2013) nevertheless undertook this work on a small group of 26 healthy participants through a pharmacological challenge and found supporting evidence of the work previously conducted on rats. Despite these initial findings, more studies are needed, preferably in larger populations, before a definitive conclusion can be reached on whether nicotine is indeed implicated in appetite.

Figure 5.1: Arcuate POMC Neurons Integrate a Diverse Set of Excitatory and Inhibitory Signals Involved in the Central Regulation of Energy Balance (Cowley et al., 2001)
5.4 The Relationship between Weight and Smoking Cessation

Williamson et al. (1991), were the first to report accurate weight gain on smoking cessation. Using the NHANES I, they measured weight at two time points for 1885 smokers between 1971-75 and 1982-84. Of interest, 41% (409 men and 359 women) of the participants quit smoking within a year. They found that for those who were abstinent, their weight gain, after adjusting for confounders, was 2.8kg for men and 3.8kg for women. Also, they reported more than 9.8% of men and 13.4% of women gained more than 13kg. This study also found smokers at baseline were lighter than non-smokers; however, at follow-up measurements, their weights were nearly the same. The main strength of this study is that both height and weight were measured objectively, as opposed to previous studies which had used self-reports. Using the Lung Health Study, O'Hara et al. (1998) studied 5,887 participants measured at five years apart. Some participants for this study were older by 10 years, than those in Williamson et al.’s (1991) study (35-60 years vs. 25-74 years). O'Hara and colleagues found a 5kg weight gain in both sexes at year one, and less weight gain thereafter. At both time points, women were noted to gain more weight than men. Weight gains of >10kg were reported for 33% of the sample who were abstinent for a year compared to 6% in smokers. Both studies were unable to quantify the mechanism of weight gain, due to the non-recording of caloric intake, but were important studies due to the sample size of both cohorts and their generalizability. A larger longitudinal study, using data from nine European countries involving 329,391 participants who were followed-up for five years, reported an average weight gain of 0.44 kg CI (0.36- 0.52) for men and 0.46 kg CI (0.41- 0.52) for women (Travier et al., 2012). This averaged to nearly 2.8kg after 5 years, with only 5% gaining more than 12kg for the same period, less than the results of other studies.

In a more recent meta-analysis of 62 clinical papers, Aubin, Farley, Lycett, Lahmek, and Aveyard (2012) reported a mean weight gain of 4-5kg at one year on post quit. Thirteen per cent gained more than 10kg during the same period. Weight gain was reported to be highest within the first three months (average 1kg per month). Unlike in previous studies (O'Hara et al., 1998; Williamson et al., 1991), this study was limited to participants in a clinical trial setting. Often participants in this setting are smokers who are more dependent, have greater needs and have attempted to quit multiple times. This study also found that between 16-21% of smokers actually lost weight on quitting. The authors provided no explanation for the study findings. There
is a possibility that the findings indicate that some individuals are destined to gain weight while a minority might actually lose weight during their quit attempt.

In summary, quitting smoking is associated with weight gain. Moreover, a minority of patients can also gain 10kg or more as a result of their quit attempt.

5.5 Mechanism for Smoking Cessation Weight Gain

Weight gain happens when there is an imbalance in energy consumption and energy intake. Nicotine plays a significant role in suppressing appetite both directly and indirectly through the POMC as explained earlier in section 4.2.2. The removal of nicotine may lead to weight gain through the reduction of resting metabolic rate which results in an increase in appetite. The latter is believed to happen through the reduction of ghrelin. This leads to inhibition of the POMC by NPY. The removal of nicotine also stops nicotine’s action directly on the α2β3 nicotinic receptor at the POMC. This then reduces both leptin and serotonin release, and their subsequent reduced action on the POMC. All of this leads to increased appetite and possibly impending weight gain as a result.

Another possible mechanism for gaining weight is behavioural factors such as sedentary lifestyle. Tobacco smoking has been termed a “gateway behaviour” whereby smokers often make unhealthy behaviour choices such as poor exercise and poor food choices, apart from increased use of other drugs such as alcohol (Kaufman, Augustson, & Patrick, 2011; Prochaska, Spring, & Nigg, 2008). A study using the NHANES 1999-2006 data reported that those who were classified as having moderate sedentary behaviour were 1.34 times more likely to be obese. Those with high sedentary behaviour were at greater risk. They were 1.78 times more likely to be obese than those with low sedentary behaviour and had noticeably higher BMI (Kaufman et al., 2011). Current smokers with higher levels of sedentary behaviour were also heavier than those with lower levels. Former smokers were also found to be more sedentary than those who had never smoked, and this led to the notion that sedentary behaviour developed during the smoking years and continued following smoking cessation. Therefore, these may be explanations for the role of nicotine cessation and behavioural factors in weight gain post quit.

Another mechanism which is beginning to receive attention is the possibility of substituting addictions (Ogden, 1994; Sussman et al., 2011). There is growing
evidence that food, especially hyper-palatable foods with various combinations of fat, sugar and salt, may act in a similar manner in their action to drugs of abuse (Gearhardt & Corbin, 2011). Neuroimaging studies have found certain foods to release dopamine in the limbic system, in a similar fashion to addictive substances (Volkow, Wang, Tomasi, & Baler, 2013). Smokers who quit often report the need for sweet foods (Rodin, 1987). Sugar, independent of fat, has been shown to be responsible for weight gain and can account for a proportion of the weight gained on smoking cessation (Te Morenga, Mallard, & Mann, 2013). The use of food in the past has often been reported as being more as ‘food desire’ to replace the desire for cigarettes (Ogden, 1994). This was before food, particularly food which contains certain contents such as sugar, was known to mimic other addictive substances. Even then, before the concept of food addiction was introduced, some have written about food reinforcement being greater than food desire, but somewhat mediated by dopaminergic activity (Epstein & Leddy, 2006). Currently, food addiction is gaining acceptance within the scientific community (Brownell & Gold, 2012; Ashley, Gearhardt, Corbin, & Brownell, 2009a) and may be an alternative mechanism to explain weight gain after smoking cessation (Audrain-McGovern & Benowitz, 2011). This concept, however, has not been clinically researched to date in smoking cessation.

5.5.1 Predictors of Weight Gain among Those Wanting to Quit

There are a number of risk factors which may lead to individuals gaining weight on smoking cessation. For clarity, these risk factors are classified as general, smoking and weight factors.

5.5.2 General Factors

Those in the younger age group were often reported to be at risk for weight gain as a result of smoking cessation. O'Hara et al. (1998), using the Lung health Study, reported mean ages of 48 years for male and 49 years for female of those quitting smoking who are more likely to gain weight. Using the NHANES I, Williamson et al. (1991) reported those under 55 were more likely to develop weight gain.

When weight gain risk was investigated in terms of gender, women appeared to be at greater risk (Flegal, Troiano, Pamuk, Kuczmarski, & Campbell, 1995; Klesges, 1997; Pistelli, Aquilini, & Carrozzi, 2009; Williamson et al., 1991). Aubin et al. (2012), however, were unable to come to the same conclusion in their meta-analysis.
investigating weight gain and gender, due to insufficient information in the publications used for their study.

Studies examining ethnicity and weight gain on smoking cessation are limited. In their study, Williamson et al. (1991) reported that those of African American descent were three times more likely to gain weight (>13kgs) than Caucasian Americans. Among Asians, studies have been restricted to Japanese men, and the reported weight gain is around 2kg post quit. These findings are below the generally anticipated weight gain of 4-5kg reported by other researchers (Kadowaki et al., 2006; Tamura et al., 2010).

### 5.5.3 Smoking Factors

A significant factor which appear to be the most consistent predictor for weight gain are smoking factors. A high number of cigarettes smoked per day (25 of more) appears to be positively associated with weight gain in a number of studies (Caponnetto & Polosa, 2008; John, Hanke, Rumpf, & Thyrian, 2005; O'Hara et al., 1998; Williamson et al., 1991). In a study of 7,124 German participants recruited from a national health examination survey, a proportion of overweight and obese were associated with the number of cigarettes per day for both male and female (John et al., 2005). In this study, when age, education level, alcohol and exercise confounders were controlled, male former smokers smoking the highest number of cigarettes per day were five times more likely to be obese than current smokers. This was not seen in women former smokers. In a Williamson et al. (1991), study, men were 5.7 times, and women 4.7 times, more likely to gain weight with an increased number of cigarettes per day (25 or more) compared to current smokers. The Lung Health Study, O'Hara et al. (1998) reported an inverse relationship between cigarettes per day and weight loss among current smokers.

### 5.5.4 Weight Factors

Weight history has also been associated with weight gain, although there is little agreement on baseline weight predicting weight gain and obesity. John, Meyer, Rumpf, Hapke, and Schumann (2006), in a study of 4075 participants recruited from Lubeck, Germany, found those with increased appetite or weight at baseline were associated with a higher BMI amongst former smokers compared to current smokers. Participants were part of the Transitions in Alcohol Consumption and Smoking (TACOS) study, and the authors concluded that those with increased appetite or
weight as a withdrawal symptom were at higher risk of having a higher BMI at 3 years.

A fear of weight gain has been shown to discourage smoking cessation in women. Similarly, men have also been reported as attributing a fear of weight gain as a reason not to quit (Clark et al., 2004; Spring et al., 2009). Although weight concerns have been attributed to an increase in relapse to smoking (Meyers et al., 1997; Wee, Rigotti, Davis, & Phillips, 2001), these similar concerns are not associated with increasing weight. White, McKee, and O'Malley (2007) found that those who reported using cigarettes to control weight were not seen to gain actual weight. In another study examining weight concerns and body image (Pomerleau et al., 2001), all participants who reported having very high concerns about weight gain on quitting tended to be heavier than those who reported to be somewhat concerned or not concerned at all about their weight (157.3 +/- 35.8 vs 149.0 +/- 36.1 vs 130.2 +/- 26.0 pounds respectively). Those who were highly concerned also had a distorted image of self in multiple dimensions of body image measurements. The women in the study were also found to smoke more cigarettes and thus were more addicted to nicotine, a situation most likely to perpetuate further their weight gain on cessation. Considering that participants who endorsed high concerns about weight gain on quitting were different from participants who were either somewhat concerned or not concerned, this group may be uniquely different from the others, an area that will likely benefit from further study.

In summary, those with an increased appetite or weight at baseline and those highly concerned about their weight were a high risk of gaining weight when attempting to quit smoking.

5.6 Treatment Availability

Although increased appetite and weight have been recognised for some time as withdrawal phenomena of smoking cessation, the development of treatment to address this has been limited (Tobacco Use and Dependence Guideline Panel, 2008). Some guidelines report weight gain as an undesirable consequence which may discourage initiating a smoking cessation attempt, or as a cause of early relapse (Ministry of Health, 2007; Zwar N et al., 2011) whilst others do not mention it at all (CAN-ADAPTT., 2011).
Pomerleau et al. (2001) reported that smokers who rated highly on concerns about weight gain on quitting were different from those without similar concerns, and understanding this population might be important in assisting in the management of their quitting. These smokers are often highly addicted, unlikely to quit on their own and have a distorted view of their body image. These individuals may benefit from behavioural intervention, together with pharmacological treatment. Unfortunately, treatment for weight control has been mixed in terms of smoking cessation. Newer agents such as rimonabant, which was initially found to show promise in both assisting in quitting smoking and reducing post cessation weight gain, have subsequently been deemed unsafe in other studies and have therefore been withdrawn from use for smoking cessation (Caponnetto et al., 2012). A newer agent, which has been shown to be useful in both smoking cessation and weight management, is Lorcaserin, a selective serotonin inhibitor (Shanahan et al., 2015). In a recent clinical trial of 603 smokers with an average of 4 quit attempts, the abstinence rates, both continuous and 7-day point prevalence, were better compared than placebo, and the weight gain was comparable (+0.73 vs +0.76). However, this is the only study so far investigating the role of Lorcaserin for smoking cessation and too early to recommend further.

A meta-analysis by Spring et al. (2009) investigated the role of behavioural treatment and successful quitting in reducing post cessation weight. This meta-analysis included ten from the 779 publications found in their final analysis. The authors found that combined smoking and weight related behavioural control was associated with both increased cessation, OR 1.29 CI (1.01 - 1.64, p = 0.041) and weight reduction in the short term, OR -0.30 CI (-0.057 - -0.02, p = 0.035). In the long term, however, combination treatment has not been shown to be effective. In the Spring et al. study, short term cessation was defined as outcomes at less than 3 months and long term as more than 6 months. Where possible, abstinence was considered to be continuous abstinence whereas other studies have often reported abstinence criteria as a 7-day point prevalence. These findings indicated that combination treatment was useful for the duration of highest risk of weight gain post cessation, which was early (as early as 2 weeks) and usually within 3-months. This meta-analysis was unable to provide long term (>6 months) outcome conclusions as the duration of the current available studies was not long enough. The study with the longest duration period was 16 weeks (Spring et al., 2009).
The Cochrane group recently released a study aimed at assisting in the treatment of smokers with post cessation weight gain (Farley, Hajek, Lycett, & Aveyard, 2012). The two main objectives of this study were to ascertain the effectiveness of treatments to address post cessation weight gain, and to identify treatments for smoking cessation which might affect post cessation weight gain. Unlike the previous study (Spring et al., 2009), outcomes were measured at six and twelve months, as opposed to three and six months. For the first objective, sixteen studies were identified. There was no evidence that pharmacological treatments including dexfenfluramine, naltrexone and phenylpropanolamine assisted post cessation weight gain. However, these treatments were not shown to affect smoking cessation rates either. Behavioural treatment outcomes were mixed, with more intensive treatments appearing more effective than general weight management, although effectiveness varied in duration. Some of these treatments also affected abstinence outcomes (personalised weight management and cognitive behavioural therapy) and others (very low calorie diet) did not show better outcomes at 12 months. These findings, however, were limited by the small number of studies for analysis (N = 1-2) in each intervention reported.

The most widely studied smoking cessation intervention was of treatments using NRTs. Farley (2012), reported effectiveness at reducing weight gain [-0.45kg CI (-0.66 to -0.27)] at end of treatment but this was not found to be sustained at 12 months. Other treatments such as bupropion, fluoxetine and varenicline were all shown to influence post cessation weight gain; however, effects were not sustained at either 6 or 12 months. In the studies assessed, the use of fluoxetine showed no weight gain in participants, which was in keeping with the understanding of serotonin’s role in weight control (refer to section 4.2.2), but fluoxetine was also not found to be an effective smoking cessation treatment (refer to section 3.7.3). However, as mentioned previously, the new agent lorcaserin, which acts on the serotonin 5HTc receptor, appears from one study both to have a weight neutral property and to assist in smoking cessation (Shanahan et al., 2015).

Considering that weight gain is also attributed to energy imbalance, exercise together with smoking cessation may assist as a behavioural intervention and may also aid weight reduction (Bush, Lovejoy, Deprey, & Carpenter, 2016). When the available data is pooled, the effect of exercise on post-cessation weight gain at end of
treatment, not seen initially, was found significant at 12 months [-2.07kg CI (-3.78 to -0.36)] (Farley et al., 2012).

5.7 New Zealand Studies

There have been two published studies addressing the role of weight gain and smoking cessation using the New Zealand population. Both are population based studies and have attempted to understand the current obesity situation in conjunction with smoking status. Both studies had a good response rate (>70% for each study). The first study used three cross-sectional surveys in Auckland totalling 3,074 participants over three time points from 1982 to 1993-4 (Simmons, Jackson, Swinburn, & Yee, 1996). This study, however, excluded both Māori and Pacific people in their analysis. The investigators reported on the steady rise in overweight and obesity amongst both men and women during this period. The mean change in smoking status in both genders between these two time points only increased the body mass index by 0.06kg/m\(^2\) with a decrease in smoking of 7% and 10% respectively for men and women in the same time period. Current smokers were lightest and ex-smokers were heaviest in this study for both genders. Exercise did not change these findings. The authors of this study reported that the rise in BMI over the ten plus years was more likely caused by external factors rather than a drop in cigarette smoking. This study, however, was limited in its generalizability, being more representative of the European and Asian populations of New Zealand.

Using the 2002/3 New Zealand Health Survey, Martin Tobias, Yeh, and Jackson (2007) attempted to describe the co-occurrence and aversion/clustering of tobacco use and obesity. Clustering was measured when the observed prevalence of both smoking and obesity exceeded the expected prevalence, given the independent distribution of the risk factors was the product of individual risk factors. Aversion, on the other hand, was the opposite i.e. when the observed prevalence of the combination is less than the expected prevalence of individual risk factors. For this study (Martin Tobias et al., 2007), unlike Simmons et al. (1996), Māori made up a third of their sample. The study reported Māori, compared with non-Māori, as having co-occurrence of tobacco smoking and obesity by a ratio of 2.7 (10% Māori vs 3.7% non-Māori). Māori were also reported to be more likely obese and to smoke tobacco compared with non-Māori. No clustering was reported in this study. Being cross-sectional, the study was unable to address trends of smoking on obesity rates and
vice-versa. The study, however, used self-reports for smoking status which can lead to an underestimation of smoking status. Also, neither New Zealand study included any dietary assessment; it was therefore not possible to determine dietary intake and its potential impact on obesity.

5.8 Summary

Despite the interest and research in the relationship between weight and smoking cessation, there is still much that is not understood about the relationship between the two variables. More recent studies have found that those who quit smoking do gain weight as opposed to losing weight, and for some individuals this weight gain can be more than 10kgs (13%). For others, actual weight gain, or the fear of weight gain, complicates smoking cessation. There is limited local information on this issue, despite New Zealand having a significant proportion of the population being overweight.

The concept of switching of addiction is an interesting idea which is increasingly being studied of late. Although earlier researchers have observed a possible relationship between quitting smoking and comfort eating, the idea of food as a possible addiction is rather new and has been studied minimally in those with nicotine addiction.

More studies are warranted in this area of research to understand better the relationship between weight gain and quitting smoking.
CHAPTER 6 – Literature Review: Smoking Cessation, Depression and Weight Gain

6.1 Chapter Overview

This chapter will bring together the three variables that are focussed by this thesis – quit smoking, depression and weight – and investigate the relationship between them. At the end of this chapter, the study rationale and the objectives of the study will be stated.

6.2 Overview

A literature review was conducted in February 2016 using the MEDLINE (From 1946 till current), EMBASE and PsycINFO online database. Search terms used were ‘smoking cessation or smoking’ AND ‘weight’ AND ‘major depression or depression or depress*’. Searches were limited to humans and English publications. A second search through the references of these publications was conducted to identify publications that were missed using the databases mentioned. Publications were excluded if they did not include information on these topics.

There are very few studies which investigate the three conditions together (Frederick, Hall, Humfleet, & Muñoz, 1996), and studies investigating the inter-relationship between depression, weight gain and smoking cessation are equally limited (Levine, Marcus, & Perkins, 2003).

The association between depression and obesity has been shown to be significant (Stunkard, Faith, & Allison, 2003), similar to the relationship between depression and smoking. The direction of this relationship, however, is still debatable. There appears, though, to be a difference between male and female association with depression and obesity (Stunkard et al., 2003) which was explored in chapter five. In a meta-analysis involving 17 studies of depression and obesity (de Wit et al., 2010), the association between depression and weight were significant, and became increasingly significant when outlier studies was removed. This same study also found depressed females to be more affected by weight gain leading to obesity compared to males, pooled OR 1.31 CI (1.23-1.4). Another meta-analysis of 16 studies with longitudinal designs found that having depression at baseline was associated with a 1.8 times greater risk for obesity (Blaine, 2008). After controlling for confounders, this relationship was still significant; however, the magnitude was reduced and the estimated effect size was
This study compiled data from 33,000 participants with a mean follow-up time of 7.6 years, and included both adolescents and adults. Females were also twice more likely to develop weight gain and become obese if they have had depression in the past, OR 2.57 CI (2.27-3.91) (Blaine, 2008). One explanation for this may be related to the self-medication hypothesis. Instead of using tobacco, food is used as a replacement. This phenomenon has been called comfort eating (Stunkard et al., 2003). In section 5.4 certain foods were reported to act similarly to drugs of abuse, allowing the release of certain neurotransmitters such as serotonin and dopamine, both of which can assist in reducing depression. The neurotransmitter serotonin itself has also been implicated in appetite regulation. As seen in Figure 4.1, serotonin acts at the POMS to regulate eating behaviour. A reduction of serotonin may lead to feeding dysregulation, and this was reported to be corrected with SSRIs (Shanahan et al., 2015; Spring et al., 1995).

Conversely, obesity leading to depression has also been found to be significant. In a study of 9000 participants recruited from the NHANES, an association between obesity and depression was found for women but not for men (Onyike, Crum, Lee, Lyketsos, & Eaton, 2003). Women were nearly two times more likely than men to be depressed within the past month, OR 1.82 CI (1.01-3.3). This association increased when severely obese women were studied. This study found that women who were severely obese were nearly five times more likely to develop depression, OR 4.98 CI (2.07-11.99) compared to those who were overweight and obese but with BMI < 35. This association was found, however, to be weaker in a systematic review of 24 publications, which included both longitudinal and cross-sectional studies (Atlantis & Baker, 2008).

In another meta-analysis involving 15 studies of >50,000 participants using studies which had outcomes for both overweight and obesity, a bi-directional causality was reported (Luppino et al., 2010). In this study, baseline obesity increased risk for depression more than being overweight [OR 1.55 CI (1.22-1.98) vs. OR 1.27 CI (1.33-1.87)]. In this same study, baseline depression was also associated with obesity, OR 1.58 CI (1.33-1.87). Possible explanations may be a shared effect, of either genetics or environment. In a study of 993 female twins from the University of Washington Twin Registry (Afari et al., 2010), a modest association was reported. This study found a 12% shared genetic component between depression and obesity using a best-fit bi-variate model. A shared environment between the two conditions...
may also play a part due to unhealthy lifestyle choices. Often, depression and obesity have been associated with lower socioeconomic status which can lead to unhealthy choices, including the lack of exercise and poor food choices. It can be presumed that obesity can lead to depression, and depression can therefore lead to increased obesity, and thus a vicious cycle ensues.

Among the few studies attempting to investigate the inter-relationship between smoking, depression and weight gain, one involves tobacco smokers who were classified as depressed and concerned with weight (Vickers et al., 2003). The study, comprising 618 university students, found that participants who were considered depressed, based on the CES-D were likely to have greater weight concerns. This was also associated with a maladaptive coping skill, namely an increase in tobacco smoking in response to their negative mood. In another study, comparing smokers with a positive lifetime history of depression with those without that history, those with a positive history endorsed higher scores for the use of cigarettes to control their weight (p<0.05) (Weinberger, George, & McKee, 2011). In a third study (Addicott, Gray, & Todd, 2009), 82 women smokers were recruited from the local community. The aim of the study was to investigate the women’s dieting status, self-efficacy, and temptation to smoke after mood induction. Using a series of pessimistic statements to induce a depressed mood, and optimistic statements to induce an elated mood, the researchers were able to show reduced self-efficacy, and therefore reduced dietary restraint, during depressed mood states and increasing cigarette use at the time. Therefore, smokers with depression either past or current were more likely to have higher weight concerns, and were seen to use smoking as a method for coping compared to smokers without a similar mood condition.

There is one study which investigated smoking, depression and weight as the main objective. Leventhal et al. (2010) reported tobacco smoking and tobacco dependence moderated the depression and obesity connection. In this study, participants were recruited face to face through the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC; Wave 1, 2001–2002), a population based survey of non-institutionalised residents in the United States of America. Depression status was determined using DSM-IV criteria, similarly for tobacco dependence using the Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS-IV). BMI was objectively measured through self-reporting of weight and height. Logistic regression analysis found that tobacco smoking was found to moderate significantly
the predictive influence of depression in the past year on current obesity and body mass index (P<0.0001). This interaction remained after adjusting to demographic factors and psychiatric status. Moreover, supplemental analysis found tobacco use remained to influence the interaction on depression and BMI. The role of tobacco was postulated to either influence mood, therefore reduce food consumption (depression might increase caloric intake) or compete with food at the brain reward sites and reduce consumption. However, despite these promising findings, this study was limited to a cross-sectional design which might increase bias, self-reporting of weight and no biochemical verification of smoking status. This study also did not take into account physical activities and strategies to cope with mood which might confound the study results. Nevertheless, this study did show there was an interaction between smoking, depression and weight, however more studies were needed to replicate the findings.

Pomerleau et al., (2001) in their study on body image and smoking attempted an analysis using variables of body mass index, smoking status and depression status recorded using the CES-D and found no significant inter-group relationship. However, this study highlighted the plausible inter-relationship between depression, smoking cessation and post-cessation weight gain; and the authors suggested more research to investigate this be conducted.

6.3 Does Weight Gain and Depression Influence Smoking Cessation Outcomes

There has been little on the inter-relationship between depression, weight gain and smoking cessation outcomes in the literature. One study, aimed at developing an algorithm using a signal detection method and focused on the interval from end of treatment to 24-months, involved a longitudinal cohort of 1,044 smokers who completed a smoking cessation trial (Killen et al., 1996). Four hundred and twenty participants remained abstinent for three months from trial completion. The analysis focused on nicotine dependence, and investigated the impact of depression symptoms and weight change independently on smoking cessation relapse. Four subgroups were identified at 24 months with abstinence rates of 33% to 79%. The researchers reported that those who were identified with high depression scores on CES-D, and gained weight during that period, were nearly three times more likely to have less relapse at 24 months, OR 2.90 CI (1.41 – 5.96). The study findings indeed contradicted current understanding on this matter. However, the authors have
suggested that, should patients with depression develop weight gain, advising them to temporally accept their weight gain may be a treatment worth investigating.

Another study (Widome et al., 2009) involving only women aged 40-65, who were recruited through a population based survey, examined the association between smoking cessation and depression in women of different weight. Of the 4,640 participants, obese and depressed smokers had more difficulty in quitting smoking and were unlikely to quit within the year of study, OR 2.48 CI (1.26-4.88). The researchers also reported current and lifetime depression prevalence increased with increasing BMI categories (p<0.001). Current depression was also associated with obese women only. Limitations of this study were that information of non-respondents was not assessed, and height and weight were self-reported. In a study by Levine, Marcus, Kalarchian, Houck, and Cheng (2010), of pregnant smokers who had quit and who were followed-up to investigate post-partum relapse, mood and weight were associated with possible relapse. Pregnant women who associated strongly with increased weight gain concerns also associated smoking with weight management and were reported to relapse earlier (p=0.007). Those with positive affect using the perceived stress scale were also found to have decreased relapse rates. The main study’s limitation, however, was a high attrition rate. Only just over half of the initial participants were accounted for at the end of the study.

A study of 219 women with post-cessation weight concerns, who were recruited to participate in a smoking cessation clinical trial, found no difference between those who had a history of lifetime depression compared to those without, in terms of successful quit attempts (Levine et al., 2003). They were, however, more likely to drop out from the study, if they had lifetime depression, by a factor of three, OR 2.9 CI (0.99-8.5). The study also found a much higher prevalence of lifetime depression in those with post-cessation weight concerns. All participants for this study underwent standard cognitive behavioural therapy and intervention included either an additional behavioural weight control program, additional cognitive behavioural therapy to promote acceptance of modest weight gain, or non-specific support. There was also no difference in weight gain between those with a lifetime history of depression and those without. This study recommends additional research to further understand the relationship between smoking cessation, weight gain and mood.

In summary, when extrapolated from the studies where depression and weight gain are studied independently, it is postulated that having both depression and weight
gain together will hinder successful smoking cessation. From the three studies that have been mentioned, there is still a lack of understanding between the three variables of interest and therefore further studies which take into account the limitations are needed.

6.4 Study Rationale

Smoking cessation programs have varied in their approach, and also in the interventions which have been offered. These programs have received recognition by being incorporated in the Framework Convention on Tobacco Control as an effective strategy and an integral aspect in tobacco control. There is, however, limited information in understanding if these programs work in people with depression and weight gain particularly in a clinical setting.

Both depression and weight gain in smoking have been studied rather extensively, the former more so. However, there appear to be gaps in the research in terms of descriptive and predictive information. There are obvious gaps in investigating the relationship between both depression, weight and smoking cessation, and even less information on the inter-relationship between the three.

The literature reviewed has also highlighted what limited information is available in New Zealand for smoking cessation, especially on the consequences of quitting. There is a definite lack of available information on the relationship between depression, weight and smoking cessation. Information on both service users and providers is also limited, and no study using mixed-methods research, investigating smoking cessation, has been found. This may be an obstacle to achieving a smoke free New Zealand by 2025, as the pool of smokers in need of assistance becomes increasingly ‘hardened’ and are from the ‘under-served’ population. It is the recognition of the scarcity of, and the many uncertainties in, the studies on smoking cessation, depression and weight gain, that led the investigator to conduct the SCeME study.
6.5 SCeMES Aims and Objectives

The SCeMES is aimed to investigate the relationship between smoking cessation, depression and weight gain, exploring the experiences of participants attending a smoking cessation program in Christchurch. The objectives are:

1. To determine the association between depression and smoking cessation outcomes
   a. by investigating the prevalence of depressive symptoms amongst patients in a smoking cessation program
   b. by investigating depression and its association with quitting smoking amongst patients in a smoking cessation program
   c. by determining the predictors for depression and their variables and quitting smoking amongst patients in a smoking cessation program

2. To determine the association between weight and smoking cessation outcomes
   a. by investigating weight variables associated with quitting smoking amongst patients in a smoking cessation program
   b. by determining the predictors for weight variables and quitting smoking amongst patients in a smoking cessation program

3. To determine the association between depression, weight gain and smoking cessation outcomes

4. To explore the experiences of patients attending a smoking cessation program
METHODOLOGY
CHAPTER 7 - Methodology: Introduction, Concept and Rationale of use

7.1 Chapter Overview

This chapter describes the SCeMES methodology, a mixed methods research (MM) study comprising SCeMES-Quantitative (QN) and SCeMES-Qualitative (QL) methods. It also provides a brief outline on MM as a methodology, and highlights current issues pertaining to this methodology. The researcher’s worldview is also included in this chapter to better explain his position within the research. The MM research design of choice is introduced, together with the justification for its use. An MM purpose statement is provided and the chapter ends with an outline of the subsequent sections for this thesis.

7.2 Description of Mixed Methods Research

7.2.1 Introduction

Although not described as MM per se, the discussion on mixing different types of data has been around for a number of decades, through the idea of mixing multiple quantitative data (Campbell & Fiske, 1959) and quantitative and qualitative data (Jick, 1979). However, MM as presently understood was introduced by Patton (1980), whereby he suggested utilizing both experimental and naturalistic data together and described the possible ways of doing so. MM has since been discussed widely over the past 25 years and used in various disciplines, not only in education and evaluation, but also in health (Tashakkori & Teddlie, 2010b). Within the past decade, MM has increasingly been recognised as a methodology, with some researchers calling it the third methodology after quantitative and qualitative research (Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 2010b). Other researchers, however, have been less convinced. Although agreeing that MM is a research method, they have not concurred that it meets the ideals of a methodology as such (Gorard, 2010). Despite the above, there has been increasing interest in the use of MM as a methodology for research theses, publication in the sciences and MM research has also been increasingly funded by research grant bodies (Clark, 2010; Tashakkori & Teddlie, 2010b).
7.2.2 Definition of Mixed Method

The definition of MM since its introduction has been actively debated. Initial proponents of MM understood it to be the basis for studies in which mixed research methods were used (Creswell & Clark, 2007; Greene, Caracelli, & Graham, 1989). Others took MM to mean the mixing of various specific methodologies which produced its own paradigm or worldview, language and technique (Tashakkori & Teddlie, 2003). A landmark study attempting to define MM, reported on the interviews of 19 leading MM methodologists from an initial sample of 31 (Johnson, Onwuegbuzie, & Turner, 2007). The researchers reported on five themes which defined MM: the mixing of quantitative and qualitative research; the place at which the research was mixed i.e. at the beginning, middle or end; the breadth of mixing i.e. the mixing of data only or mixing at all stages; the purpose of mixing; and the orientation of the mixing i.e. whether the research question drove the mix, or whether the participants or researcher were driven to mixing the research approaches. The above findings can be summarised as follows:

> Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration (R. B. Johnson et al., 2007).

This was subsequently followed by the notion that MM was not only a method for conducting research, but an approach to understand the social world. Newer definitions have since included a philosophical emphasis, while others have included research design within their definition (Tashakkori & Teddlie, 2010b). Creswell and Clark (2007) defined MM using core characteristics which emphasised and included MM as a method, philosophy and research design. More recently, Tashakkori and Teddlie (2010b) reported on eight contemporary characteristics of MM: methodological eclecticism; paradigm pluralism; an emphasis on diversity at all levels of the research; an emphasis on continuum as opposed to dichotomy; an iterative approach to research; a focus on the research question; a set of standard research designs and analytical processes; and a tendency to balance and compromise. These eight characteristics were summarised in the findings by Johnson et al. (2007). In addition, the leading journal for MM (Creswell & Tashakkori, 2007) defined MM as follows:
Mixed methods research is defined as research in which the investigator collects and analyses data, integrates the findings, and draws inferences using either qualitative and quantitative approaches or methods in a single study or program of inquiry.

This definition is in keeping with the characteristics reported by Tashakkori and Teddlie (2010b) and the findings and summary by Johnson et al. (2007). This definition is also the preferred definition of MM for this thesis.

7.2.3  Paradigm or World View

Paradigm, also known as worldview, has been described as “a set of generalizations, beliefs and values of a community of specialist” (Kuhn, 1970). Of the two terms – ‘paradigm’ or ‘worldview’ – the term used in this review, and the one preferred by Creswell (2009), is ‘worldview’. As described by Creswell (2009), ‘worldview’ is understood to be what the researcher brings to their research in the quest for knowledge. This includes both the researcher’s combined beliefs and assumptions about knowledge which, in turn, further inform the study being undertaken.

There are four worldviews often reported when the issue of paradigms is discussed. Often these same worldviews are linked to a certain type of research design or method. The four worldviews are: positivism, or post-positivism, which is often linked to quantitative research design; constructivist to qualitative research design; participatory; and pragmatism. The latter two are considered to work best with MM. In positivism/postpositivism, the research question often includes rigorously testing a hypothesis which, through a quantitative method, is often numerical in nature. With constructivism, the meaning of the research is determined by the researcher and data is often collected in the narrative form. For the participatory and pragmatism worldviews, absolutes are avoided, and the stance is taken that some research questions are better answered though the numerical form while others are better answered though the narrative form. What is paramount for this final approach is the importance of the research question posed, and the best method used to answer it. These worldviews were, however, initially believed to be mutually exclusive and therefore were unable to be combined. This ‘incompatibility’ was due to the nature of the philosophy of knowledge these worldviews were aiming to discover.

Quantitative research has often been described as gaining knowledge deductively and objectively, and is meant to be generalizable, whereas qualitative research is the
opposite, in which knowledge is achieved through an inductive approach, and is subjective and context based, among other things (Tashakkori & Teddlie, 2010b). The “paradigm wars” were the consequence of the belief that worldviews are unable to be mixed. The beliefs were maintained by “purists” in both fields of quantitative and qualitative research, due to the researchers’ inflexibility in accepting any alternative possibility for their respective arguments (Creswell & Clark, 2007; Tashakkori & Teddlie, 2010b; Teddlie, 2009). It is now generally accepted that the “paradigm wars” are over. This acceptance has come to light as MM has become increasingly more accepted, and also with it having a wider reach (Tashakkori & Teddlie, 2010b). It is now more accepted to think of worldviews as the shared beliefs between researchers (Morgan, 2007), moving away from a dichotomy as described earlier, and moving more towards thinking in terms of a continuum (Tashakkori & Teddlie, 2010b). At this present moment, MM is accepted as a research methodology in between quantitative and qualitative methodologies (Teddlie, 2009; Teddlie & Yu, 2007). Refer to Figure 7.1 below (with permission).

![Figure 7.1: The Purposive-Mixed Probability Sampling Continuum](image_url)

Of the four often mentioned worldviews, pragmatism is regarded, however, as the worldview of choice for MM. Greene and Hall (2010) have argued that although pragmatism appears to be the worldview most often reported when using MM, it is not the only worldview. They explain that pragmatism has many interpretations, including being thought of as “what works” in practice (Greene & Hall, 2010), which
Biesta (2010) has referred to as “everyday pragmatism”. Creswell (2009), has identified four basic characteristics of the pragmatism worldview: it focusses on the consequence of research, it is problem centred, it is pluralistic, and it takes into consideration real world practice. This worldview has been described as leading to problem solving, and to active oriented research questions, and to being progressive and fair in its execution (Denzin & Lincoln, 2011).

### 7.2.4 Types of Mixed Method Research Designs

As MM has become widely accepted and used as a method, it has developed its own language or terminology (Creswell & Clark, 2007; Tashakkori & Teddlie, 2010b; Teddlie & Tashakkori, 2011). A common language is useful to ensure uniformity (Creswell, 2009; Teddlie, 2009; Wolff et al., 2013) in understanding concepts of MM (Tashakkori & Teddlie, 2010b). As a result of this, some common types of research design have often been referred to when conducting MM. However, they are not exclusive to MM. Therefore, this has allowed for flexibility in the conduct of other MM research designs for researchers of the future (Greene, 2007). MM research design depends on the research question, the level of interaction between the two different methodologies, the priority of quantitative and qualitative contribution to the research, timing, the skill set of the researcher, and possibly funding (Creswell, 2009; Creswell & Clark, 2007; Teddlie & Tashakkori, 2011).

Despite the good intentions of MM proponents to develop a typology or a classification of research designs exclusively for MM, this endeavour has been challenging, if not elusive (Tashakkori & Teddlie, 2010b). MM, having both a quantitative and qualitative underpinning, due to the latter being an iterative component, allows flexibility in answering a broad range of research questions. Nastasi, Hitchcock, and Brown (2010), after reviewing the literature, have summarized existing typologies based on six criteria. The typologies are classed into types of MM research designs – Types I–VI – , which refer to I) the number of elements; II) types, mixing and priority of data; III) the stages in which the mixing occur; IV) a focus on an integrated approach; V) an involved iterative approach; and VI) the dealing with synergistic design approaches. These have subsequently been divided further into two main designs which Nastasi and colleagues (2010), have termed as basic (involving criteria types I-III) and complex (types IV-VI) designs. Creswell (2009) has also identified four basic designs (convergent parallel, explanatory sequential, exploratory sequential and embedded) and two which are
more complex (having multiple elements) which he refers to as transformative and multiphase designs. Teddlie (2009), has referred to quasi-mixed designs, including MM, which have little mixing between both quantitative and qualitative research elements.

7.2.5 Benefits

Teddlie (2009), has observed three major benefits attributed to MM: the ability to tackle research questions which are both confirmatory and exploratory in nature; the ability to provide better inference or understanding on the subject matter; and the ability to provide various inputs and views based on expertise of both quantitative and qualitative concepts. MM is able to provide information using both numbers and narrative which has allowed findings to be reported with more context compared to using either quantitative or qualitative methodologies on their own (Creswell & Clark, 2007; Jick, 1979). Moreover MM has allowed the researcher to provide extensive research findings as a result of being able to mix the different types of methodologies available (Tashakkori & Teddlie, 2010b). The possibility of using multiple worldviews previously mentioned has also provided various inputs (breadth and depth) in the research discussion. It has given the researcher the ability to answer research questions, which would otherwise have been difficult through the use of either research methodology, sometimes known as a mono-method, on its own. Gorard (2010), has stated as a matter of fact that using MM is only logical. Using the argument of daily life situations, he has gone on to explain MM research in everyday practice as being likened to buying a house or car where one would not only look at the numbers (specifications for examples), but also interview people who have used or purchased the item of interest. MM is also practical, in the sense that MM allows the researcher to use various research methods to conduct research, and to express the result findings in both numbers and words (Creswell, 2009).

7.2.6 Controversies and Critiques

Ever since the possibility that various methodologies and methods can be mixed, MM has been open to various critiques and controversies. The most common criticism of MM is the “incompatibility thesis”, raised earlier, between quantitative and qualitative worldviews in conducting research. This has been, however, harmonized through the continuous work and efforts of the major proponents of MM (Creswell & Clark, 2007; Greene, 2007; Tashakkori & Teddlie, 2010b) and has increasingly been accepted by
early critics (Denzin & Lincoln, 2011). Yet much work is still required within the field as MM becomes an increasingly popular research methodology.

For some qualitative researchers, MM has been viewed in the past as a methodology which has subjugated qualitative research under the quantitative research heading (Denzin & Lincoln, 2011). These concerns, however, have been unfounded, with most authors on MM emphasising equal consideration for both quantitative and qualitative contribution (Tashakkori & Teddlie, 2010b; Teddlie, 2009). An equal mastery of both research methodologies has been encouraged to allow the best possible conclusions for the data collected (Creswell & Clark, 2007).

Due to its research design, MM, has often been seen as more time consuming, and therefore more expensive, than conducting research using either quantitative or qualitative methodologies on their own (Creswell & Clark, 2007). This has been especially noted when there has been a need to be proficient in both research methodologies (Creswell & Clark, 2007). This has not gone unnoticed by leading proponents of MM. They recommend that MM be conducted only if the research enquiry necessitates the use of MM rather than either quantitative or qualitative research on their own (Creswell, 2009; Creswell & Clark, 2007; Greene, 2007; Tashakkori & Teddlie, 2010b; Teddlie & Tashakkori, 2011).

Lately, more recent issues which have appeared to dominate the MM field are the need for MM exclusive language, typology and research questions (Tashakkori & Teddlie, 2010b; Teddlie & Tashakkori, 2011). Although most innovators of MM are in agreement on the need for MM language to ensure meaning between researchers, they are more accommodating towards typology compared to other areas within MM which might also require attention, such as ‘rigor’ in MM (Creswell, 2009; Greene, 2007; Tashakkori & Teddlie, 2010b). The issue regarding the best method to state an MM research question has been fairly recent. This sudden need for a more exclusive method to state such a question is most likely the consequence of the increasing use of MM. Newer researchers to MM are believed to have required greater guidance in conducting proper MM research (Creswell, 2009). Also, a uniform research question for MM would also strengthen MM as a methodology for certain researchers as opposed to using mono-methodology for their research enquiry (Creswell & Clark, 2007).
Together with the increasing acceptance and usage of MM, attention on the “how to do” has become increasingly important. More and more, questions are being raised on various aspects of MM, such as which phases within the research should the methods be mixed: during the analysis, the interpretation of result findings, or during the presentation and reporting of the research (Greene & Hall, 2010), amongst others. These issues have since intensified but have progressively been addressed by MM proponents (Creswell & Clark, 2007; Tashakkori & Teddlie, 2010b). With MM being used more widely, collaborative and cross-cultural issues are also emerging within the field (Tashakkori & Teddlie, 2010b).

7.3 Applying Mixed Methods to the SCeMES

The researcher has taken a pragmatic worldview in undertaking this research project. In keeping with pragmatism, the research has been driven purposefully by the research question which includes both the understanding of the relationship between the researched variables, and also the need to explore the ‘lived experiences’ of these same participants in their journey. Pragmatism, being a problem centred approach, is flexible and orientated to real-world practice. As a result, it allows a more definitive conclusion based on the evidence obtained (Creswell & Clark, 2007). It is not committed to any one worldview, and therefore is able to adapt to the research situation. In this same notion, pragmatism as a worldview allows for “freedom of choice” and “what works” at the time (Creswell, 2009).

In keeping with the pragmatist worldview on “what works”, a quantitative study was used for research questions which attempted to find a cause-and-effect relationship; this is termed as SCeMES-QN in the main SCeMES. This quantitative phase of the SCeMES focused on selected variables of interest, detailed observations of measured variables, and tested theories through the literature review which, in essence, has a postpositivist slant (Creswell & Clark, 2007) to the research enquiry often linked to quantitative research. Knowledge for the SCeMES-QN, thus, was gathered deductively.

For the second phase of the study, involving the exploration of the experiences of participants who were quitting through a smoking cessation program, also known as the ‘lived experience’, a qualitative study was considered as the best approach to investigate this phenomenon. Information was obtained inductively, meaning there was no prior hypothesis for the possible conclusions; and knowledge for the subject
matter was obtained from the evidence provided by the researched participants. This qualitative component of the SCeMES is referred to as the SCeMES-QL and has an interpretative or constructivist slant. Knowledge was acquired through the understanding of meaning of an event; this was obtained from participants of the research from their subjective views on a certain issue of interest (Creswell & Clark, 2007).

### 7.4 Research design

For the SCeMES, a sequential explanatory mixed methods research design was employed (Creswell, 2009). The follow-up explanatory variant was preferred, emphasising the quantitative phase of the MM (Creswell & Clark, 2007). Using the model proposed by Creswell and Clark (2007), this research design consisted of two parts: a quantitative phase (SCeMES-QN) followed by a qualitative phase (SCeMES-QL). The qualitative element of the design was implemented to assist in explaining the findings of the initial phase of the study. Refer to Figure 7.2 below for flow of study.

**Figure 7.2: Flow of MM Research Design**
(Creswell & Clark, 2007)

#### 7.4.1 Areas of Mixing

The mixing or integration of both quantitative and qualitative elements was decided to take place during the research question formulation phase where both an investigative and exploratory study was determined for the research. This closely follows Creswell and Clark (2007). In explaining the sequential explanatory MM studies, Creswell and Clark (2007) referred to studies in which the qualitative phase built on the initial quantitative phase.

The main reasoning underpinning this study was that the quantitative data and its analysis addressed the research question. The qualitative data and its analysis further refined and explained the quantitative results by exploring the views of the
‘purposively’ selected participants in more depth. Both sets of results were then integrated at the end of the study. This allowed the discussion and conclusions of MM to consist of both numerical and narrative descriptions which in turn allowed for a better ‘picture’ of the phenomena under study (Creswell & Clark, 2007).

### 7.4.2 Justification for Using Sequential Explanatory Mixed Method

The use of MM in this type of study design is useful especially for researchers who are quantitative orientated (Creswell & Clark, 2007). This design allowed the researcher to investigate the relationship between variables and at the same time to explore other possible explanations for the trends or initial findings. For a new researcher in MM, the sequential explanatory MM design was considered to be direct in its implementation, in that two separate studies were conducted one after the other, and the reporting was able to be done in the same sequence (Creswell, 2009; Creswell & Clark, 2007). There was also an emergent element to this type of study where findings or experiences from the initial study were allowed to influence the other (Ivankova, Creswell, & Stick, 2006). This in turn may provide a greater understanding of the results for discussion.

### 7.4.3 Ethics

This study was approved by the Central Health and Disability Ethics Committees (HDEC), Ethics Reference CEN/09/08/055. The SCeMES was an amendment to the Zonnic and Patch Study (ZAP) mentioned later in this chapter. Further ethical considerations for the qualitative element, pertaining to the methods for the SCeMES-QL study, will be discussed in chapter nine.

### 7.5 The Researcher’s Role

Qualitative research, being interpretive in nature, exposes the researcher to potential strategic, ethical and possibly personal issues in the conduct of the research (Locke, 2007). In order to reduce the impact of these potential biases to the research findings, the researcher often state his/her position within the research. Examples of this can include researchers explicitly stating their worldview in the conduct of the study, and providing information with regards to their biases, values and also personal background (Creswell, 2009).
7.5.1 The Researcher

The researcher is a Malaysian who has lived his life in equal proportions in the United States of America, New Zealand and Malaysia. He graduated with a medical degree from New Zealand but decided to practise and specialise in psychiatry in Malaysia before returning to New Zealand to complete his doctoral studies. He has never smoked, nor experimented with cigarettes; however, some of his immediate family members do smoke.

As a psychiatrist in Malaysia, his role is in general psychiatry. He is also part of the addiction psychiatry clinical team in his hospital. Tobacco control is not a major consideration in psychiatry in Malaysia. His interest arose from the observation of the number of patients under his care who were smokers. In Malaysia, 22.8% of the adult population smokes; and more men than women smoke (43.9% vs. 1.4%) (Hum, 2016). However, data on underserved populations, such as mental health, is very limited (Amer Nordin Amer Siddiq, 2012).

During his doctoral study, the researcher was involved with the ZAP study, a clinical trial for a new smoking cessation treatment, which allowed him to assist smokers to quit. Involvement in the ZAP study led to his interest in his current doctoral study, the SCeMES. In addition, during this period and in the following years he became involved with advocacy work, both in New Zealand and Malaysia, in tobacco control, particularly among mental health clients (Amer Siddiq, 2012, 2013; Amer Siddiq & Bullen, 2014).

Of significant importance during the period of the doctoral study were the earthquakes of September 2010 and February 2011, the latter earthquake being the most devastating natural disaster experienced by Christchurch. His experience of the earthquakes has transformed his outlook on life, and also strongly affected the conduct of the study.

7.5.2 The Christchurch Earthquakes

Christchurch is the largest city in the South Island of New Zealand with a population of 376,700 as at June 2010 (Statistics New Zealand, 2010). On September 4 2010 at 4.35am, Christchurch experienced one of the worst disasters in the history of New Zealand, an earthquake measuring 7.1 on the Richter scale. While the city sustained significant damage to property, land and infrastructure during the September earthquake, there was no loss of human life. The Christchurch region has since
experienced more than eighteen thousand earthquakes or aftershocks, 4,400 of these occurring within the six months following the September earthquake, including 28 aftershocks greater than magnitude 5. Further major seismic events occurred in December 2010, and February, June and December 2011.

The February 22 2011 earthquake, however, was the most devastating. A magnitude 6.3 earthquake struck Christchurch at 12.51pm, killing 185 people and with damage totalling an estimated NZD40 billion for insurers (New Zealand News, 2013). Many landmarks in Christchurch were lost as a result of this catastrophe, and this event did not spare disruption to the researchers and their participants. The National Addiction Centre (NAC), where the study took place, was closed for approximately twelve weeks, meaning researchers and participants were displaced, and subsequently many participants were lost to follow-up as a result. The following earthquakes and aftershocks only made it harder for Christchurch residents, and particularly those involved with the SCeMES, to continue with life as it had been prior to the earthquake. However, over the next 12 months, things slowly improved.

7.6 Mixed Method Purpose Statement

This study was conducted to address the relationship between smoking cessation and both depressed mood and weight gain among smokers who wanted to quit, and also for the researcher to understand the perspective of these smokers in their quit attempts. An explanatory sequential mixed methods design was used. This involved collecting quantitative data (SCeMES-QN), and subsequently explaining the quantitative results by using in-depth qualitative data (SCeMES-QL) gathered in focus groups and individual interviews. In the SCeMES-QN, a prospective cohort was involved to collect data from smokers participating in a smoking cessation program at the National Addiction Centre. The goal was to test whether smoking cessation was related to either depression or weight gain, or both. The SCeMES-QL was conducted as a follow-up to the SCeMES-QN results to assist in explaining the quantitative results. In this exploratory follow-up, the tentative plan was to explore the “lived” experiences with participants of the SCeMES at the National Addiction Centre.
CHAPTER 8 - Smoking Cessation, Mood and Eating Study
Quantitative (SCeMES-QN) Methodology

8.1 Chapter Overview

This chapter will describe the details of the quantitative aspects of the Smoking Cessation, Mood and Eating study. The research design, site and the population studied will be introduced. The inclusion and exclusion criterias will be described and the data that participants will be providing is also reported. Finally, the analysis for this study will be discussed.

8.2 Research Design

The SCeMES-QN was an observational, longitudinal cohort prospective study consisting of smokers wanting to quit smoking in a smoking cessation program.

8.3 Zonnic™ and Patch (ZAP) Study

The ZAP study was a smoking cessation trial which took place in Christchurch and Wellington from 2010 to 2012. There were three major sites for the ZAP study: two in the North Island of New Zealand and one in the South Island (where this present study occurred). The study involved smokers who wanted to quit smoking and who consented to receive either a placebo spray or Zonnic™, the active treatment for the study. Zonnic™ is an NRT which is delivered through a mouth spray. At the time of the study, the mouth spray was a new form of delivery device for NRT. The procedure for taking Zonnic™ was that participants squirted two squirts of the treatment into their mouths and left it there for at least 15-30 seconds to allow the treatment to be absorbed by the buccal mucosa. After that, the participants were allowed to swallow the treatment. Both the placebo and the active treatment were taken in the same manner. Details regarding the ZAP study and its findings have been reported elsewhere (Caldwell, Adamson, & Crane, 2014).

8.4 Duration

The data collection period for this study was initially scheduled for nine months from October 2010 to June 2011. However, as a result of the major Christchurch earthquake of February 22 2011, recruitment into the study was extended for another three months. The last participant for baseline recruitment was obtained in
September 2011, and the last participant for follow-up therefore was in September 2012.

8.5 Recruitment and Site

Participants for the SCeMES-QN were recruited from Christchurch-based participants attending the ZAP study. The method used for recruiting participants was the consecutive sampling method, chosen because of the limitation of the sample, time constraints due to an on-going ZAP study, and the continuous Christchurch earthquakes. A variety of strategies were used to recruit participants for the study. The main method was through the use of newspaper advertisements. Participants were also recruited through newspaper articles and television interviews on smoking where the study was mentioned at the end to assist with recruitment. Advertisements were placed on prominent noticeboards within the Christchurch Hospital, in areas accessible to the public including the elevators. Local health practitioners, such as general practitioners in Christchurch, were also sought to help with referrals to the study. The health practitioners were sent personalised letters in the mail to encourage them to refer potential participants for the study. A small minority of participants were also noted to have been recruited from the social media entity Facebook. All participants who had agreed to participate in the Christchurch ZAP study were approached to participate in the SCeMES-QN. This is considered to be the best recruitment method considering the limitations mentioned (Endacott & Botti, 2005).

All study participants were assessed and followed up face-to-face at the National Addiction Centre (NAC). The NAC was located opposite the Christchurch Hospital. Three researchers were involved in assisting with recruiting participants and assessing baseline and follow-up visits.

8.6 Inclusion and Exclusion criteria

Participants were eligible if they:

1. wanted to quit smoking
2. smoked nine or more cigarettes per day
3. were aged between 18 and 70
4. resided in Christchurch
5. intended to complete the study by attending baseline and follow-up visits
Patients were excluded if they:

1. were allergic to nicotine replacement therapy
2. had a serious medical condition including high blood pressure, cardiovascular health problems (including fast or irregular heart rhythm, angina, chest pain, a history of previous myocardial infarct); having had a cerebrovascular event such as a stroke; a history of previous stomach ulcer; heartburn; kidney disease; liver disease; an over active thyroid; pheochromocytoma and uncontrolled diabetes
3. were pregnant, intended to get pregnant during the study period, or heterosexually active and not using a reliable form of contraception
4. consumed alcohol above the low risk drinking guidelines of 21 standard drinks per week
5. were using illicit drugs at the time of study
6. were on medications known to interact with the nicotine replacement therapy, of particular note theophylline, insulin, imipramine and pentazocline

Participants were asked twice about their history of serious medical conditions, once on screening and again at baseline visit. Participants were not excluded if they were experiencing mental health difficulties.

8.7 Measures

8.7.1 Objective Measurements:

1. Weight in kilograms (using a digital weighing scale)
2. Blood pressure and pulse rate
3. Height in centimetres
4. Carbon monoxide (CO) monitoring

Weight was obtained by using a digital weighing machine. Participants were weighed in street clothing without shoes prior to the start of assessments during each visit. After weight, height was measured using a mounted stadiometer. Body mass index (BMI) was subsequently calculated as weight (kg)/height (m)².

Blood pressure monitoring and pulse rates were obtained using an OMRON 5 series blood pressure device.

CO monitoring was obtained using the Compact™ Smokerlyzer® by Bedfont Scientific Ltd. CO monitoring instruments by Bedfont Scientific Ltd have often been
reported in scientific publications (Jarvis, 1986). This particular instrument is ideal for brief intervention to monitor smoking status in various settings. It also allows wider access and use (Pearce & Hayes, 2005). The Compact™ Smokerlyzer® is also the most popular type of CO monitoring instrument due to its size and portability. There is a seven level indicator on this device which spreads over the colours green, amber and red. The non-smoking cut-off is ten parts per million (ppm) corresponding to levels below two on the instrument. These cut-off scores might differ depending on different devices and their make.

8.7.2 Questionnaires:
A number of questionnaires were used for this study to assess variables of interest. The Fagerström Test for Cigarette Dependence (FTND), Brief Questionnaire of Smoking Urges (QSU-brief) and the Brief Wisconsin Inventory of Smoking Dependence Motives (Brief WISDM) were the questionnaires originally used in the ZAP trial, and also used for the SCeMES study. The remaining questionnaires were introduced as part of the SCeMES. In total, nine questionnaires were used, one socio-demographic, three smoking related, two depression and three eating/food related questionnaires.

Data was collected using the following:

1. Socio-demographic questionnaire
   The socio-demographic questionnaire included questions about age, gender, ethnicity, current occupation and employment status. The smoking status segment asked questions about the initial age of smoking, number of cigarettes smoked, duration of smoking and the number of quit attempts. The mood segment asked for information on previous personal and family history of depression.

2. Fagerström Test for Cigarette Dependence (FTND)
   The FTND was developed in 1978 as an eight-item scale, known as the Fagerström Tolerance Questionnaire (FTQ), to provide a measure of nicotine dependence which was short and able to be self-reported (Heatherton, Kozlowski, Frecker, & Fagerström, 1991). The FTQ subsequently became the Fagerström Test for Nicotine Dependence (FTND) with only six items (Heatherton et al., 1991). Recently, the FTND was renamed the Fagerström Test for Cigarette Dependence; however, the same acronym FTND was kept, the
author contending that FTND better reflected the current knowledge on tobacco (Fagerström, 2012). The FTND is one of the most commonly known and used questionnaires to measure nicotine dependence, and has been reported to be useful in various settings and amongst a variety of different populations (Courvoisier & Etter, 2010). The six items of the FTND take less than five minutes to complete. Reliability testing with Cronbach α is reported to be between 0.64-0.91 (Heatherton et al., 1991).

3. Brief Questionnaire of Smoking Urges (QSU-brief)

The QSU-brief was developed from a 32-item questionnaire, the Questionnaire of Smoking Urges (QSU), and first published in 1991 (Cox, Tiffany, & Christen, 2001). The brief version (QSU-brief) maintains the two-factor item structure of the longer QSU. These two factors are 1) a desire and intention to smoke, with smoking anticipated as pleasurable, and 2) an anticipation of relief from the negative affect of nicotine withdrawal, with an urgent desire to smoke. The QSU-brief has ten items and takes less than two minutes to complete. The QSU-brief also reports high internal consistency, very similar to the longer QSU (Cronbach α 0.76-0.96) (Cox et al., 2001).

4. Brief Wisconsin Inventory of Smoking Dependence Motives (Brief WISDM)

The brief-WISDM was developed from the 68 item Wisconsin Inventory of Smoking Dependence Motives (WISDM), first published in 2004 (Piper et al., 2004). The brief version contains 11 subscales as opposed to the 13 in the original WISDM (Smith et al., 2010). It measures a variety of theoretically derived smoking motives which allows an understanding of the mechanism for compulsive drug use. The brief-WISDM, containing 37 items and 11 subscales, is as psychometrically sound as the original WISDM (Smith et al., 2010). A total of nine out of 11 subscales have Cronbach α >0.8 and the remaining two subscales are >0.7. Correlation between the original WISDM is similar to the brief-WISDM (Smith et al., 2010). Scoring for this questionnaire involves using means of the subscale, and also the sum of the means for total scoring. Responses are collected using a seven-point likert scale whereby 1 corresponds to “not true of me” and 7 corresponds to “extremely true of me”.

5. Beck Depression Inventory second edition (BDI-II)

The Beck Depression Inventory (BDI) was first published in 1963 and a second edition (BDI-II) was introduced in 1996 (Beck, Brown, & Steer, 1996).
is an instrument to detect symptoms of depression but can also be used to diagnose depression. At present the BDI-II is the gold standard amongst self-assessment rating instruments for depression (Cusin, Yang, Yeung, & Fava, 2010). The BDI-II has 21 items and is easy to use with minimal training. On average, a little more than 5 minutes is required to complete the questionnaire. The BDI-II is designed to detect depression in both the psychiatric and general population. Reliability testing is good at Cronbach α 0.92-0.93 and concurrent validity has also been reported to be high (Dozois, Dobson, & Ahnberg, 1998).

To score the BDI-II, items in the scale are summed and the cut off scores are determined at 0-10 (no depression), 11 – 16 mild mood disturbance, 17 – 20 (borderline clinical depression), 21-30 (moderate depression), 31 – 40 (severe depression) and above 41 (extremely severe depression) (Beck et al., 1996). The BDI-II has been used in other studies among the New Zealand population without problems (Roberts, Bushnell, Collings, & Purdie, 2006).

### 6. Hospital Anxiety and Depression Scale (HADS)

The HADS was developed by Zigmond and Snaith and first published in 1983 (Zigmond, 1983; Zigmond & Snaith, 1994). The HADS questionnaire is designed to detect symptoms of depression and anxiety. The HADS is also designed to be brief, acceptable and easy to understand. It is primarily a screening instrument and concentrates on the psychological aspects of depression. The instrument is targeted for use by clinicians in busy practices, and therefore takes less than 5 minutes to complete. The target client group are those in non-psychiatric hospitals; however, the HADS has been found to be effective in both the primary care setting and also in the general population (Bjelland, Dahl, Haug, & Neckelmann, 2002). Reliability using Cronbach α is reported to be 0.90 for the depression subset and validity is established at 0.79 (Bjelland et al., 2002). The HADS has been translated into many languages and is widely used (Snaith, 2003; Zigmond & Snaith, 1994). The instrument has been used on a population in Christchurch without any limitations (Dowson et al., 2001). To score the HADS, items in the depression and anxiety subscales are summed and the cut-off scores have been determined to be at 0-7 (no depression), 8-10 (mild), 11-14 (moderate) and 15-21 (severe) (Zigmond & Snaith, 1994).
7. Non-Essential Energy Dense Nutritionally Deficient Food List (NEEDNT)

The NEEDNT Food List was developed by the team in the New Zealand National Addiction Centre and first published in 2012 (Elmslie, Sellman, Schroder, & Carter, 2012). The list is designed to “start a conversation on eating”. It has subsequently been operationalised into the questionnaire used in this current research to give the number of times a person consumes, over the past month, each of the food items listed. The 50 food items have been compiled using the National Heart Foundation and Diabetes New Zealand “Foods to Avoid”, “Stop Eating” and “Optional Foods” lists; the Canterbury District Health Board “Supermarket Shopping Guide”; and the United States Dietary Association (USDA) population guidance on discretionary calories.

For the current study a modified 44 item questionnaire was used by merging certain food items from the original 50 item. This was done through consultation with one of the original authors of the paper (Personal communication with RS). The duration of “over the past month” was changed to “over the past week” and the NEEDNT for this study was used as a food diary alternative. A reliability study has reported the Cronbach α to be between 0.82-0.85 (Eder, 2013). For the SCeMES study, scoring was by summing up all 44 items. The higher the number of NEEDNT foods scored and the greater the frequency of consumption, the worse the diet.

8. Questionnaire on Craving for Sweet or Rich Foods Scale (QCSRF)

The QCSRF was developed by Toll and colleagues and first reported in 2008 (Toll, Katulak, Williams-Piehota, & O'Malley, 2008). The QCSRF is designed to assess perceptions about the ability of certain foods to relieve negative affect, and about self-control over eating; and also to assess the urge of smokers wanting to quit. The original publication has a 14-item scale, adapted from the Alcohol Urge Questionnaire (Toll et al., 2008). The QCSRF is used as a self-assessment tool and takes less than 5 minutes to complete. Reliability is reported at Cronbach α 0.87-0.90, and the QCSRF has been found to have good predictive validity. The QCSRF used for this study had nine items as opposed to the 14 in the original published version. This was provided by the primary author (personal communication with BT), reported to be the improved version. There are two subscales for this instrument: a craving scale and a reinforcement subscale. The scale was scored using the means of the subscales and also the
summation of the total. Exploratory factor analysis showed two factors similar to the original 14-item scale and the coefficient alpha was 0.82, indicating very good internal reliability (Amer Nordin Amer Siddiq, Adamson, Schroder, & Sellman, 2013). In the same study, the QCSRF was also found to correlate with the NEEDNT (\(rs = 0.273, N = 256, p < 0.01\)).

9. The Yale Food Addiction Scale (YFAS)

The YFAS, designed as a diagnostic tool for food addiction, was first reported in 2008 (Gearhardt, Corbin, & Brownell, 2009b). There are 27 items which include both likert and dichotomous items. The content was developed from the DSM-IV TR (American Psychiatric Association, 2000) with scales used to assess behavioural addictions such as gambling, exercise and sex. Questions were adapted to relate to the consumption of high fat and sugary items. Reliability testing is good at Cronbach \(\alpha = 0.81\) and adequate internal validity (Gearhardt et al., 2009b). For this study, the modified YFAS (mYFAS) was used (Flint et al., 2013). The mYFAS uses a core of nine questionnaire items. The mYFAs has good validity (construct) and high sensitivity and therefore provides a valid measure of food addiction (Mason, Flint, Field, Austin, & Rich-Edwards, 2013). While the original study took into account the past year, this study used the duration of the previous month, in keeping with the SCeMES’s visit timetable.

8.8 Data Collection

Table 8.1: Phases of Data Collection

<table>
<thead>
<tr>
<th>Phase</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>One</td>
<td>Training of researchers</td>
</tr>
<tr>
<td>Two</td>
<td>Pilot</td>
</tr>
<tr>
<td>Three</td>
<td>Data Collection</td>
</tr>
</tbody>
</table>

8.8.1 Phase One

Three researchers were trained to assist in data collection for the SCeMES-QN. This session was conducted by the primary researcher. The training session took place at the National Addiction Center and lasted for two hours. The session included a brief description of the study protocol and the objectives of the study, an introduction to the variables of the study, and a brief training session on the use of the various
questionnaires. A thirty-minute session on clarifying concerns related to data collection was also included and these concerns were discussed and resolved.

### 8.8.2 Phase Two

The baseline SCeMES-QN data protocol was trialled on 10 participants. This pilot was conducted to obtain feedback from both the researchers and participants. The pilot was also conducted to test the ease of use and timing of the questionnaires used for the study. From the pilot, the SCeMES-QN was found to take one hour and ten minutes to complete for the baseline data collection. No complaints were reported from either the researchers or the participants involved during enrolment and in completing the SCeMES-QN.

### 8.8.3 Phase Three

**Figure 8.1: Flow for the SCeMES-QN Data Collection**

Data was collected on five occasions during the period of one year. The five visits corresponded to baseline and four subsequent visits at one, three, six and 12 months from the initial planned quit attempt which was at week two after baseline. On
average, it took 75 minutes to collect data at baseline and 30 minutes for each subsequent follow-up visit.

Participants who agreed to participate in the ZAP study and fulfilled inclusion criteria were invited to participate in the SCeMES-QN. Informed consent was obtained, and baseline data, comprising two sections was collected. The first section included a brief explanation of the study; signing of the consent form; recording socio-demographic data and objective measurements such as weight, height and blood pressure monitoring; and completing the set of questionnaires. Expiratory carbon monoxide levels were measured at the time. In the second section, participants were asked to complete the set of questionnaires on their previous smoking status and smoking cessation management, on their mood, and on their craving for, or addiction to, food. Food intake over the previous week was taken using the NEEDNT to measure current eating habits. A quit date was arranged within a two week period, and details of a contact person were also recorded. The remaining four follow-up visits were subsequently arranged. For visits two, three, four and five a recording of quit rate within the last week (7 days) was also taken. This was the main outcome measure. All questionnaires were repeated as per Figure 8.1.

Two methods of data collection were used for the SCeMES-QN. Data was collected using both computer and paper and pen. For the data collected using the computer, data was recorded directly into the computer to minimise data entry error and data loss at the time of data collection. For paper and pen, the questionnaires were provided after completing the computer questionnaires. Either participants were allowed to enter their responses in the computers on their own, or the researcher could read the questions and record the relevant responses. In the case of the former, researchers were present together with the patients to ensure all questions were answered. The information was stored in a Microsoft Access database designed for the study. This database was linked to a server hosted and maintained by the University of Otago to ensure that the data was stored safely. In the case of the paper and pen questionnaires, all answers were filed together with the demographic data and stored in the NAC to ensure safe keeping and confidentiality.

All attempts were made to collect data for all five time points and various measures were put in place to ensure this. Among the strategies were early reminders of upcoming visits either by email messages or phone calls. Patients were contacted three times if they had missed their appointment visits, and a call to their listed
significant other was also made among one of the three calls. At the end of twelve months, participants who had not attended any late visits were called three times in order to invite them for a face to face visit where possible, or a phone call interview. At the end of data collection, when it became clear that there was much missing data, thought to be largely due to the earthquakes, follow-up data was aggregated into three time points - baseline, early and late. Early visits included visits at one and three months after a quit attempt, and late visits included both six and 12 months from the initial quit attempt.

For telephone interviews, only a limited set of questions was employed for data collection due to time constraint. The HADS was used to assess mood and the mYFAS for food addiction. The total time for the data collection by telephone was under ten minutes.

8.9 Analysis

Analysis was performed using the Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics were performed for all demographic, smoking, mood, weight and food variables. Mean and standard deviations were obtained for continuous variables, and median and mode for categorical variables. Continuous variables were subsequently analysed for skewness using both histogram and the one-sample Kolmogrov-Smirnov test. Where normal distribution was not found, analysis using non parametric tests was performed. For normal distribution, parametric tests were performed. Univariate analysis was performed between groups using an independent t-test; Fisher's test was used for continuous variable; and chi square for dichotomous variables. Variables which had multiple categories were analysed using ANOVA. The significance level was set at p< 0.05 and the confidence interval at 95% interval. Multivariate analysis was performed to predict quit attempts. For continuous variables, linear regression was performed, and for non-parametric datasets log regression was done. The dependent variable was quit rates at both early and late time lines, and independent variables were mainly mood, weight and food variables.

The SCeMES-QN involved a baseline and four follow-up visits as described earlier in the methods chapter. The earthquake disruption brought about a higher rate of non-attendance at the various follow-up appointments. Therefore, for analysis, two time points were used, baseline and early follow-up (EARLY); and baseline and late
follow-up (LATE). EARLY combined follow-up visits one and two, while LATE combined visits three and four. For participants who attended both visits in either category, the more recent visit (i.e. later visit of the two) was included and used for analysis.
CHAPTER 9 - Smoking Cessation, Mood and Eating Study Qualitative (SCeMES-QL) Methodology

9.1 Chapter Overview

This chapter will describe the components of the methodology for the qualitative aspect of the Smoking Cessation, Mood and Eating Study. In this chapter, the research design and justifications are described. The recruitment strategy and methods of data collection is reported together with methods to ensure rigor during data collection. Finally, methods of analysis is reported.

9.2 Research Design

The SCeMES-QL was conducted sequentially on completion of the SCeMES-QN. This was a qualitative study using interviews for data collection.

Qualitative research is difficult to define but has been reported as being a “field of inquiry of its own” (Denzel & Lincoln, 2011). It has attempted to study the world in its natural setting. Conclusions are, therefore, often based on the experiences and understanding of the participants (Denzin & Lincoln, 2011).

9.3 Recruitment and Sampling

Participants for the SCeMES-QL were recruited from the SCeMES-QN. They were purposively sampled, meaning they were chosen for a specific reason and not sampled at random (Tashakkori & Teddlie, 2003). Purposive sampling is unique to qualitative research and often referred to as “qualitative sampling” (Teddlie & Yu, 2007). Cases are often related to the research question and described as “information rich” or, simply, cases with the most to learn from (Tashakkori & Teddlie, 2010b). Sampling of this nature is typically small in sample size, often only including 30 or fewer participants. Cases are usually selected through the “expert judgement” of either the researcher or the informant (Tashakkori & Teddlie, 2010a). In accordance with Patton (2002), multiple purpose sampling techniques were employed in the SCeMES-QL. This sampling technique used a combination of two or more sampling strategies. Using this technique allowed for the inclusion of cases which were either representative or comparable across types of cases on a dimension of interest, with unique or “extreme” cases being included in the sampling frame (Patton, 2002).
Participants were eligible to be included in the SCeMES-QL if they:

1. had completed the baseline visit and one other visit for the SCeMES-QN
2. were willing to be interviewed either individually or in a group
3. agreed to sign an informed consent form
4. were able to converse in English

One hundred and forty participants met the criteria of at least two recorded visits in the SCeMES. Of these, 94 were able to be contacted at the end of the SCeMES-QN. However, for 20 of these participants, the ‘visits’ were telephone interviews, which left 74, who had presented in person for two visits, who were able to be contacted and were therefore eligible for interviews. Forty-one of the 74 agreed to be interviewed; nine of them were interviewed individually. These nine were either identified as ‘unique cases’ and therefore would not be suitable for groups which had a more homogenous grouping; they were unable to attend any of the focus groups planned; or they were unwilling to participate in a focus group, but were willing to participate by being interviewed.

![Figure 9.1: Recruitment for SCeMES-QL](image)

### 9.4 Data Collection

#### 9.4.1 Technique

For the SCeMES-QL, qualitative interviews were used as the main research technique to gather information.

Interviews are able to capture the actual experience of individual’s more than general beliefs and opinions (King & Horrocks, 2010). Interviews also allow the researcher and interviewee to interact and seek understanding on the questions posed (Tashakkori & Teddlie, 2010b). This interaction between interviewee and interviewer is crucial in ensuring the success of an interview (King & Horrocks, 2010). Kvale and Sven (2009), use 12 terms to describe the qualitative research interview. The interview must include the “lived world” of the interviewee and have “meaning” which the interviews seek to find out through “qualitative” knowledge. This is often
“descriptive”, “specific”, and “focussed” on a central theme. Although the theme is focussed, the interviewer’s questions can be “ambiguous” to allow deliberation by the interviewee, and can also “change” during the course of the interview, i.e. flexibility. “Sensitivity” is another aspect of the interview and the research interview might lead to a “positive experience”, although the knowledge gleaned is through the “interpersonal situation” of the interviewee. Finally, the interviewer needs to allow himself/herself the freedom of judgement and allow acceptance of the information with an open mind, termed “deliberate naïveté”.

The qualitative research interview is different from the therapeutic interview, which some have confused it with. Aspects of the qualitative interview discussed earlier might also be similar in therapeutic interviews, such as ambiguity and change, but the aim of these interviews is very different. The qualitative research interview is aimed at seeking qualitative knowledge, whereas the therapeutic interview is aimed at changing, and its main purpose is to heal (Kvale & Sven, 2009). As a result, health care providers, who are involved with qualitative research through the use of interviews, should be careful not to confuse the therapeutic interview with the research interview during data collection (Dickson-Swift, James, Kippen, & Liamputtong, 2006).

Patton (2002), has described three types of interview styles: the informal conversational interview, the interview guide, and the standardized open-ended interview. Hansen (2006), has described three other types: structured, unstructured in-depth, and informal interviews. A fourth, called semi-structured and mentioned by Hansen (2006), is similar to Patton’s (2002), ‘interview guide interviews’. Both informal and semi-structured interviews use open-ended questions, allowing interviewees to express themselves without undue influence from the researcher’s assumptions or biases. Unstructured or informal type of interviews allow for more freedom of expression than either semi-structured or structured, and are usually conducted in ethnographic type studies. Often, more skill and time is required for this type of interview due to its “go with the flow” approach (Patton, 2002). Semi-structured interviews, on the other hand, often use an interview guide. The latter contains a broad range of questions which have been predetermined before the interview is conducted. These questions should be open-ended and allow flexibility in terms of the questioning sequence. These questions should also be broad enough to provide some structure to the topic of the interview, while at the same time allowing
the participants to introduce their own ideas and areas of interest about the issue being studied. Using an interview guide, a customary line of inquiry is followed for each interviewee and often have a topic or subject area which the interviewer is interested in pursuing. These interviews might lead to a slightly different path or conversation on the interested topic. According to Kvale and Sven (2009), interview guides should be balanced thematically, meaning that the questions should be related to the topic being studied. It should also be dynamic enough to promote a positive interactive experience, allowing motivations and experiences to be shared.

The SCeMES-QL employed the semi-structured interview using an interview guide for data collection.

9.4.2 Data Collection Strategies

Two main strategies for data collection were used in the SCeMES-QL: the semi-structured focus group interviews (FG), and the semi-structured individual interviews. Focus group interviewing is a common interviewing strategy employed to collect data by using both a group approach and group interviewing techniques. The main strengths in using FG interviewing is that it allows observation during the interviewing process and therefore enables the collection of both verbal and visual data. For the SCeMES-QL, verbal data was the main data gathered using FG. Interviews are also interactive and allow for group dynamics to operate during the interviewing. Through this interaction, different types of information can be collected which might not be present during a routine one-on-one interview. FG interviews are also very useful in gathering opinions (Krueger and Casey, 2009). This technique is often used in marketing research and is increasingly used in health education research (Basch, 1987).

Focus groups are different from other forms of group interviews in that they are focussed, have a specific topic to discuss, and are moderated (King & Horrocks, 2010). A moderator, who is usually the interviewer, allows groups to run smoothly, in an ‘ordered’ fashion and often is tasked to put the group at ease. Krueger and Casey (2009) include size, composition and procedure as other aspects of a FG. Having a moderator is crucial to a FG, and is considered to be one of the main characteristics differentiating it from other group interviews (Krueger & Casey, 2009; Morgan, 2001). Hennink and Diamond (2000) have even suggested that a FG team should have not only a moderator, but also an assistant and housekeeper. Moderators play a central
role in any FG; however, the setting and set up for the interview is equally important (Basch, 1987). The characteristics of a FG have been described by Krueger and Casey (2001), as each group having five to ten members; being somewhat homogenous, meaning group members have something in common in relation to the research topic; allowing qualitative data collection; being focussed in their discussion and each session lasting less than two hours. The optimum number of participants within a group has been reported to be 6-10 (Morgan, 1997). In recent times, Krueger and Casey (2009) have advocated for five to eight participants per group, and have reported that smaller groups of five to six participants are acceptable and, not surprisingly, have been observed to be increasingly popular. Having too few in a group reduces the meaningfulness of FGs. Too many participants, on the other hand, make the group too difficult to control. An adequate number in the group has been reported to bring out group dynamics, one of the reasons why FGs are popular and useful (Krueger & Casey, 2009). The number of groups on the other hand requires flexibility. The number often depends on theoretical data saturation, meaning groups will have a tendency to report similar themes on interviewing (O'Reilly & Parker, 2013).

Semi-structured individual interviews are frequently organized in a one-on-one approach, and best conducted face-to-face. They are qualitative research interviews and fulfil the criteria discussed previously (Krueger & Casey, 2009). In the SCeMES-QL, individual interviews were used for those participants who were unable to tolerate group interviews, or who were unable to attend the focus groups but were still keen to participate in the study. For the latter individuals, every effort was made to include them in a group i.e. the timing of the group was flexible and frequent reminders were sent out. However, when this failed, and these individuals were still interested in participating, an individual interview was offered. Those categorised as unique or ‘extreme’ cases, and those who showed interest, but were too few to make up a group, were also interviewed individually using this strategy (MacDougall & Fudge, 2001).

For the SCeMES-QL, a total of five FGs were initially planned. A total of 41 participants had initially agreed to participate and were grouped accordingly. The decision to group participants into groups with some commonality was an attempt to homogenise the group to obtain better qualitative research interviews. Participants were purposively grouped according to their quit smoking status, their experience
with depression and their experience with weight gain during the course of the
SCeMES. All FG participants had experienced the Christchurch earthquakes in both
September 2010 and February 2011.

Of the five FGs initially planned, only three eventuated. Two of the five groups were
unable to proceed due to poor turnout (Group 1, 2 of 6 could attend and in Group 2, 3
of 5 could attend), and a decision was made to cancel them. Efforts to re-run the two
groups failed, as a specified time could not be agreed on by the group members.
One group included those with a history of depression who had successfully quit, and
the other group included those who had completed the SCeMES but were not
successful in quitting smoking. Individual interviews were subsequently arranged with
participants from these two groups.

In total, nine individual interviews were conducted which comprised participants that
were not included in the two cancelled groups and others who were considered to
meet the term ‘extreme case’ and believed to be able to provide more context to the
research questions.

9.4.3 Development of Interview Guide

A three-step approach was followed in developing the interview guide, as described
by King and Horrocks (2010), for the SCeMES-QL.

Step One

The first step involved developing the initial questions for the study and the scope for
the line of inquiry. King and Horrocks (2010), have suggested three main sources for
identifying topics for inclusion: personal experience, literature review, and conducting
a preliminary study. The information obtained using these strategies may assist to
shape the comprehensiveness of the interview guide. The information will also assist
in deciding which types of questions are to be asked, the sequence of the questions,
possible probes and how best to incorporate new information as it becomes available
during the course of the interview, i.e. the level of flexibility. An interview guide
encourages new information to emerge during the interview which is then used to
further develop the interview guide (Hansen, 2006; King & Horrocks, 2010). Interview
guides can be dynamic and might change during the course of the FGs. For the
SCeMES-QL interview guide, topics were sourced from the primary researcher’s role
as both a clinician and psychiatrist in teaching and in treating smokers with tobacco
dependence. Further information was sourced from the experience gained through the SCeMES-QN. In that study, both participants and researchers (those assisting with data collection) were interviewed through informal interviews during the consultation process i.e. when the participants were asked to answer the various questionnaires such as the BDI-II or the NEEDNT for example. Hansen (2006), has described interviews conducted through an unplanned or opportunistic method, such as when “opportunity arose”, as informal interviewing. Further information was also collected from discussions with the supervisory team (for the SCeMES) and also the ZAP team members. The supervisory team was not directly involved with the ZAP study and therefore provided information which mainly related to the research questions of interest, whereas those involved with the ZAP study were able to relate more experiential information from their day-to-day involvement in assisting smokers to quit smoking.

Following on from these discussions, a total of five themes and 34 questions were initially developed. The five themes were related to quitting smoking in a program such as the SCeMES, mood, weight, resilience, and new treatment. The questions were grouped into these themes, and sequenced to be asked in this exact order. It was anticipated that through this sequence, the main information to be gleaned in response to the research questions would be gathered first, before moving onto other areas of interest such as the impact of the earthquakes on quitting smoking. During the course of the interviews, flexibility was employed to gather data. If, during the interviews, the interviewee gave related information sought from the interview guide but not in the order planned, to allow less disruption during the interviewing process, the interviewer facilitated the discussion in the direction of the interviewee rather than holding rigidly to the interview guide. Moreover, all questions developed were open-ended questions which allowed exploring the “lived experience” of participants in the SCeMES. The interview questions were initially pre-tested with two colleagues from the NAC, who were familiar with the SCeMES, to ensure that the questions were clear, easily understood and that the sequencing was easy to follow.

**Step Two**

The second step involved a pilot interview. This pilot interview had three objectives. The first was to pilot the interview guide for ease of use, relevancy, clarity, the timing and to identify themes or questions which might have been missed. The second
objective was to conduct a dry run of a FG which was the main interviewing method used for the SCeMES-QL (Krueger & Casey, 2009). The third was to ensure that the “quality of the interviewer” was established and maintained (Kvale, 1996; Kvale & Sven, 2009). A total of ten people were recruited for the pilot study and invited to the FG interview. Five confirmed their attendance, but only three attended the session. The primary researcher was the moderator, while an experienced qualitative researcher in the supervisory team was assistant and scribe. The qualitative researcher also assessed the moderator and provided feedback about the moderator’s interviewing technique at the end of the session. This exercise was important to ensure the moderator showed competence in qualitative interviewing skills as “the quality of the information obtained during the interview was largely dependent on the interviewer” (Patton, 2002). The interview took 45 minutes in total and a debriefing session was conducted at the end. In keeping with recommendations on guideline development, allowance was made to address emerging questions during the course of the interview and improve the interview guide accordingly (Hansen, 2006; King & Horrocks, 2010).

Step Three
The third step involved finalising the semi-structured questionnaire. A total of four themes were included in the final questionnaire and included 39 questions for those in the groups who had quit smoking at the time of the interview, and 45 for those who were still smoking. The four themes of interest were: the participants’ experience in quitting using a structured programme how mood, especially depression, affected their quit attempt; how weight gain affected their quit attempt; and their experience of quitting through the aftermath of an earthquake.

9.4.4 Data Collection Site
According to King and Horrocks (2010), the setting of an interview plays a major role in the interview. This has been echoed by others (Basch, 1987; Krueger & Casey, 2009). Three main aspects that might lead to a successful interview are comfort, privacy and quiet (King & Horrocks, 2010). Therefore, all interviews were conducted at the NAC. For FG interviews, sessions were conducted in a meeting room that was able to comfortably accommodate up to ten participants. This room also had a small kitchen area which allowed for light refreshments to be provided at the end of the sessions. The sessions were arranged for after working hours and lasted between 60
to 90 minutes. The decision for choosing times outside of general working hours was to increase participation, and also to ensure that the sessions were private and quiet.

For the individual interviews, sessions were conducted at the primary researcher’s clinical room. Flexible timing was arranged to allow for all interested participants to participate in the study; therefore some interviews were held during office hours and others were not. Similarly, each session lasted approximately 90 minutes.

9.4.5 Recording the Data

All interviews were recorded using two digital recording devices. These devices were supported with two professional microphones to ensure conversations were clearly recorded.

For each group interview, an assistant was present and acted as scribe. The same assistant was used for all the group interviews. The scribe documented placement of participants during the interview and also provided descriptive observations during key moments, items which may have been missed when using the recording devices on their own.

After completing each interview, the primary researcher (who was also the moderator) recorded his thoughts and experiences of the interview. After the primary researcher had recorded his interview, he and the scribe also had a debriefing session on areas that worked, and areas to improve on. These sessions allowed reflection on the recently concluded interviews.

9.5 Ethical Considerations

A number of steps were undertaken to ensure that the SCeMES-QL was of a high ethical standard. Among these steps were the following:

1. The study was approved by the Central Health and Disability Ethics Committee (Refer to 7.4.3).

2. All participants were asked twice about their interest in participating in the interview, both at the beginning, and nearing the completion, of the initial SCeMES-QN. In the first instance, the interviews were mentioned at the start of the SCeMES, informing participants that this study had two parts in which they could participate; and, second, an expression of interest in participating was required in the written informed consent form. Participants who showed
an interest were subsequently followed up with a phone call prior to the start of the SCeMES-QL. Those who had initially declined to participate when asked at the beginning of the SCeMES, but after completing the SCeMES-QN decided to participate, were also included. At the last follow-up for the SCeMES-QN, participants were asked if they were still interested in participating in the interviews; and those who did not complete the SCeMES-QN were asked during the telephone interviews.

3. Participants were re-informed about the SCeMES-QL on the day of the interview. Information on the study objectives and the role of anonymity were both stressed at the beginning of both FG and individual interviews. Both interviews required a second informed consent form, specific to participating in the qualitative interviews, to be completed.

4. For FG participants, group rules were discussed at the start. As part of this discussion, the issues of respecting others, and the need for confidentiality outside of the group, were raised.

5. Participants for the group sessions were also provided with light refreshments at the end of the interview. All participants were reimbursed for their time with a NZD20 Motor Trader Association (MTA) voucher, which was to cover transport to and from the interviewing site. For the few that were interviewed individually, an MTA voucher was given and coffee and tea were provided.

6. On completion of the interviews, all participants were provided with the opportunity to read the completed transcripts. This was in keeping with member checking (this will be expanded on later). Transcripts were only directed to the participants’ personal email accounts, and any names or identifying descriptions were carefully altered to ensure anonymity. For those who did not want to participate in this exercise, transcripts were not sent to them.

7. All interviews were recorded and transcribed verbatim. Recordings were initially transcribed by the primary researcher for the pilot and two individual interviews. This task, however, was subsequently outsourced to a professional transcribing service. A confidentiality agreement was signed by the transcribing service at the beginning of the service, to ensure that all recordings were safely stored during transcribing and destroyed on completion.
task. All transcripts were ensured not to include any identifying records which may allow other people to identify individual participants. Careful consideration was given to other items such as working history and details, names of spouse or children, and any reference to relationships.

8. Transcripts and analysis were kept at the NAC under lock and key during the period of analysis. For transcripts which were digital, the documents were secured in a password protected computer, which was able to be accessed by the primary researcher. All transcripts were subsequently kept in the NAC under lock and key on completion of the study. Digital documents were kept on a password protected hard disk.

9.6 Methods of Rigor

Rigor is necessary to ensure that a study is of sound quality and of a certain standard. In quantitative research, this is referred to as either reliability or validity. Reliability simply refers to the ability of a given instrument to measure the same thing at every use. Validity, conversely, entails that the instrument measures what it is supposed to measure. Although important, both methods of rigor are not easily applied in a qualitative study, as it often follows a constructivist paradigm as its theoretical model. Guba and Lincoln (1989) have therefore proposed parallel terms for reliability and validity. These are referred to as credibility and transferability. However, according to Morse, Barrett, Mayan, Olson, and Spiers (2008), this action has resulted in confusion within the field. Since the shift to the use of parallel terminologies, there has been a move away from emphasising rigor in the conduct of a study in favour of ensuring ‘trustworthiness’ in the reporting of the study. Both, however, do not necessarily mean the same thing (Morse et al., 2008). This alternative terminology has been especially favoured by North American researchers, Morse et al. (2008) have therefore suggested maintaining both initial terminologies (validity and reliability) to ensure some level of standardization, particularly for written reports. This approach had been adopted for the reporting of both components of the SCeMES.

9.7 Reliability

This term, or its equivalent dependability, is concerned with how precise a variable is measured. For qualitative research, this refers both to the interview and to
subsequent transcription. The SCeMES-QL employed two techniques to ensure reliability of the data. The first was ensuring investigator responsiveness (Morse et al., 2008) through activities likened to ‘calibration’ of the interviewer. The interviewer was essentially the main instrument in conducting qualitative research. The primary researcher, who was the interviewer, was observed under direct supervision on two occasions for his interviewing skills, and was then debriefed on both sessions. The interviewer was also required to record both interviews, which were then discussed during supervisory sessions to enhance the quality of the interviewing for the best possible data collection.

The second technique to ensure data reliability was during the course of transcribing the interview recordings. The transcripts were re-read with the recordings to ensure that the information was not missed and that the transcription was as accurate as possible.

### 9.8 Validation

Validity or trustworthiness, which encapsulates terminologies such as credibility and transferability, was important to ensure that the method of measurement measured what it was supposed to. Onwuegbuzie and Leech (2007) have reported on the use of a model, referred to as the Qualitative Legitimation Model (QLM), to illustrate areas which might compromise internal and external validity of a qualitative study. The QLM identifies 12 internal threats, including researcher bias, reactivity, and effect size; and 14 external threats, which include items such as action validity and evaluative validity. Through the identification of these threats to validity, methods to reduce them are discussed. The authors have suggested a number of actions such as prolonged engagement, persistent observation, triangulation, leaving an audit trail, member checking, weighting the evidence, checking for representativeness of sources of data, checking on researcher effect, contrast and comparisons, theoretical sampling, checking the meaning of outliers, using extreme cases, ruling out spurious relations, replicating a finding, referential adequacy, following up surprises, structural relationship, peer debriefing, rich and thick descriptions, the modus operandi approach, assessing rival explanations, negative case analysis, confirmatory data analyses and effect sizes. Morse et al. (2008), however, have noted the need to use these actions earlier in the study, during the development or conduct of the study, rather than only in the reporting, which is often as the end of what is currently being
performed. The various actions suggested by the identification of QLM also vary depending on the type of qualitative study being conducted. Validity is also not dichotomous, a ‘yes’ or a ‘no’, but a continuum, described as having a degree of validity (Morse et al., 2008).

The SCeMES-QL incorporated a number of suggested methods to increase validity for the study. One of these methods included the use of member checking, referred to by Guba and Lincoln (1989) as one of the most important methods to increase validity. Member checking for this study involved participants being provided with their transcripts after transcribing, for clarification prior to analysis. This was to ensure that the spoken interview was not lost of its meaning, and that what was provided in the interview was how participants meant it to be (Liamputtong, 2009). Of the 25 interviewed, 18 agreed to their transcripts being sent to them. Only one participant made slight changes to the interview by omitting certain statements. This person was one of the seven who were interviewed individually. The other participants for both FG and individual interviews found no issues with their respective transcripts. In one individual interview a recording malfunction occurred. This resulted in the loss of half the interview. The researcher, however, managed to salvage the situation as best as possible by recalling what was remembered during the interview, and immediately informing the participant through a phone call, subsequently emailing the transcript to the participant on the same morning. The interviewee concurred with the researcher’s memory of the events with minimal additions.

An audit trail was also employed in the study. An audit trail uses documents, thoughts, pictures, notes or any item which was used in the study to allow some trail of the thought process in reaching to the conclusion of the analysis (Morse et al., 2008). For this study, the historical development of the interview guide, the pilot and test interview recording and notes, the recording of all interviews, and the discussion on analysis were kept to provide an audit trail for best practice.

The use of extreme cases can be useful in analysis, and also to reach a conclusion, as it allows the researcher to verify items or issues which might be different in the ‘general’ population studied (Miles & Huberman, 1994; Miles, Huberman, & Saldaña, 2013). For the SCeMES-QL, participants who were different, or who experienced extreme complications such as severe weight gain or who were admitted to hospital due to depression, were included to allow a different perspective for the study.
Researcher bias has been described in the QLM, but is defined by Miles and Huberman (1994), as including two sources, predominantly the bias of the researcher towards the participant, and also the other way round, the bias of the participants towards the researcher. Among the steps taken in reducing this threat to validity is a declaration of clear intentions of the interviewing process during the start of each interview, the signing of the informed consent form, the inclusion of extreme cases to allow diversity of information, discussion of research with colleagues, and having the research questions firmly in mind throughout (Miles & Huberman, 1994; Miles et al., 2013; Onwuegbuzie & Leech, 2007).

In the analysis process, one method to reduce threats to validity is to provide as much as possible of the research findings and notes which will allow for a clear description of the item of interest, also known as ‘thick and rich descriptions’. This process includes a detailed and complete description of the text or data which then allows the researcher to maximise the ability to search for meaning (Onwuegbuzie & Leech, 2007). What is defined as ‘complete’ or ‘thick’ data is still not well understood (Guba & Lincoln, 1989). ‘Thick and rich descriptions’, are undertaken to ensure that the meaning of the data is not lost during analysis.

9.9 Analysis

To analyse is to draw meaning from the data. Miles et al. (2013) define analysis as having three parts: data reduction, data display, and data verification or conclusion. The method of analysis chosen for the SCeMES-QL was the general inductive approach introduced by Thomas (2006). This analysis consisted of “systematic steps in analysing qualitative data in which the analysis was guided by specific evaluation objectives” (Thomas, 2006). The general inductive approach allowed the research findings to emerge from the data through coding and theme generation which did not need to be attached to a set theoretical concept. This method of analysis fitted well with the pragmatic worldview adopted by the researcher.

Thomas (2003) has described five procedures in a general inductive approach: the preparation of the data, ‘immersion’ by the researcher in the data, creating categories for the data, searching for overlaps, and refining and revising the categorical system. No specific methods are mentioned for analysis using the general inductive approach, and researchers have reported using thematic analysis and constant comparative methods for creating categories and looking for overlaps. Similarly,
those using this analysis approach are known to use thematic reporting or the use of matrices to present findings (Miles & Huberman, 1994; Miles et al., 2013).

For the SCeMES-QL, the data was ‘prepared’ by transcribing interviews verbatim, and ‘cleaned’ by reviewing transcripts together with audio-recordings to ensure transcripts were as accurate as possible. The transcripts were prepared to be compatible with the use of NVivo, a computer software which is often used to store and assist with categorizing or coding of data in qualitative studies (Welsh, 2002).

Transcripts were then read and re-read to ensure ‘immersion’ in the data. Immersion is the process whereby the researcher immerses himself in the data to allow familiarity with the contents (Miles et al., 2013). Coding was subsequently undertaken after this stage. Two methods of coding were used. The first, descriptive coding, is a method of taking a segment of textual data of interest and inserting a code which is descriptive and free of interpretation. The second coding method used is pattern coding, which are codes of textual data more explanatory in nature (Miles et al., 2013). Codes were listed in a sourcebook and discussed with the supervisory team before being re-coded if needed (Saldaña, 2013).

Thematic analysis was then performed whereby codes were read and re-read to look for certain repetitive and overlapping categories which were labelled as themes. Themes were then named and defined to bring meaning to the data (Liamputtong, 2009). The themes were then presented in a matrix where possible, or otherwise reported thematically (Miles et al., 2013). Both methods of display also included appropriate raw data called quotes to give meaning to the information that was inductively generated. Where possible, ‘thick description’ of the data was used to describe these quotes (Miles et al., 2013). At all stages of analysis, both reliability and validity of the data was undertaken as previously described to ensure that the results were trustworthy.
RESULTS
CHAPTER 10 - Quantitative Results (SCeMES-QN)

10.1 Chapter Overview

This chapter describes the results for the quantitative study of the SCeMES. A general overview of the study participants is described followed by an overview of the follow-up participants in the study. The description continues with the description of participants who completed the study and those who managed to become abstinent. The chapter ends with the findings for the association between quitting smoking and depression, quitting smoking and eating, and findings when all three variables were analysed together.

10.2 General Sample Profile

A total of 1628 participants responded to the ZAP study advertisement in Christchurch (method section 8.5). Six hundred thirty-five participants were screened out through the online system, and another 416 by telephone screening. Five hundred seventy-seven were invited to attend a face-to-face baseline screening. Twenty-one participants were subsequently excluded: four failed the mental health screening, two were excluded due to heavy alcohol consumption, two due to medical complications, and two for smoking fewer than 9 or less cigarettes. Nine were excluded because their Fagerstrom Test for Cigarette Dependence (FTND) scores were less than 3. Two participants were mistakenly randomised during the face-to-face screening and were subsequently excluded. Table 10.1 is a summary of the sample distribution. In all, 556 participants were eligible for the ZAP study, and 256 consented to participate in the SCeMES (Figure 10.1).

Figure 10.1: Recruitment Progression
Table 10.1: Reasons for exclusion from the ZAP Study (and SCEMES-QN)

<table>
<thead>
<tr>
<th>Reasons</th>
<th>Number excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental Health</td>
<td>37</td>
</tr>
<tr>
<td>Pregnancy/Contraception</td>
<td>12</td>
</tr>
<tr>
<td>Age &gt;70 years</td>
<td>35</td>
</tr>
<tr>
<td>Logistics</td>
<td>53</td>
</tr>
<tr>
<td>Alcohol use &gt; 21 standard drinks</td>
<td>85</td>
</tr>
<tr>
<td>Contraindication Medication</td>
<td>23</td>
</tr>
<tr>
<td>Contraindication medical problem</td>
<td>82</td>
</tr>
<tr>
<td>Smoking &lt;9 cigarettes</td>
<td>36</td>
</tr>
<tr>
<td>FTND Score &lt;3</td>
<td>82</td>
</tr>
<tr>
<td>Already quit</td>
<td>90</td>
</tr>
<tr>
<td>Declined or not interested</td>
<td>508</td>
</tr>
<tr>
<td>Wrong or changed contact details</td>
<td>23</td>
</tr>
<tr>
<td>Interested, but no appointment suitable</td>
<td>2</td>
</tr>
<tr>
<td>Spoilt randomization</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1,072</td>
</tr>
</tbody>
</table>

10.3 Baseline Sample Description

10.3.1 Baseline Smoking Status

The mean age for initiating smoking was 16.3 years (range 7-43, SD = 4.5 years). The mean duration of lifetime smoking was 30 years (range 4-55, SD = 11.9 years), and the mean number of cigarettes smoked per day (CPD) at baseline was 19.9 (range 9-50, SD = 7.1). Participants in this study had attempted to quit on average four times (M = 4.2, range 0-100, SD = 7.2) prior to enrolment.

Nicotine addiction severity was measured using three instruments as described previously. The mean scores were FTND 6 (range 3-10, SD = 1.8), QSU-brief 21.8 (range 10-63, SD = 11.1) and Brief WISDM 48.1 (range 18-73.3, SD = 11.3). The mean carbon monoxide level at baseline was 4.5 (range 1-7, SD = 1.3).

More than half of the sample reported they were not living with another smoker (n = 154, 60.2%). On completion of the ZAP, 47.7% (n = 122) were found to be on active treatment (NRT) compared to 52.3% (n = 134) who were on placebo.
10.3.2 Baseline Sample Demographic Profile

The mean age of the SCeMES sample was 46.2 years (range 19-70, SD = 12.1 years) and more than half, 140 (54.7%), were females. The majority identified as Caucasians, 233 (91%), while only 19 (7.4%) identified as New Zealand Māori. Of the remaining four (1.6%), two identified as Pacific, one as African and one as Asian.

Nearly a fifth had tertiary level education (n = 44, 17.2%), and a quarter had completed secondary schooling, obtaining a school qualification (n = 66, 25.8%). A fifth of the participants reported having not completed Form Five (Year 10) (n = 50, 19.5%) and therefore had no school qualification. The majority of participants (n = 208, 81.3%) were employed, and most of them were working full time (n = 134, 68%). The most common occupation was a tradesperson (n = 60, 23.4%). This was followed by people in managerial positions and clerical or administrative positions (n = 40, 15.6%) each. Forty-eight (18.8%) participants reported not being employed.

10.3.3 Baseline Mood Status

Ninety participants (35.2%) reported having been diagnosed with depression by a doctor in their lifetime. Just over a quarter (n = 70, 27.3%) reported a family history of depression, while 15 (5.9%) did not answer, and the remaining did not know of anyone with depression in their immediate families.

The mean score for the HADS depression subset (HADSD) was 1.8 (range 0-12, SD = 2.2), and the mean score for the BDI-II was 2.6 (range 0-28, SD = 3.9).

Using a cut-off score of 8 or greater for the HADSD and 16 or greater for the BDI-II, the current prevalence of depression was 2.3% (n=6) and 6.6% (n=17) respectively for the instruments, at baseline (Refer to Table 9.16).

10.3.4 Baseline Eating Status

The mean weight in kilograms for the sample was 79.9 (range 40-185, SD = 19.1), and the mean BMI (kg/m²) was 27.4 (range 16.41-74.11, SD = 6.2) with a median of 26.4. Just over a third of the sample, 89 (34.8%), was found to have a normal BMI. More than half were overweight (n = 95, 37.1%) or were obese (n = 68, 26.6%), whilst a very small number of participants were found to be underweight, (n = 4, 1.6%).
The Questionnaire on Craving for Sweet or Rich Foods Scale (QCSRF) measures craving for sweet and rich foods. The mean QCSRF score was 18.1 (range 9-50, SD = 8.5) at baseline. The Non – Essential Energy Dense Nutritionally Deficient Food List (NEEDNT), a questionnaire used as a proxy to measure consumption of unhealthy foods, was found to have a mean score of 76 (range 11- 285, SD = 45.7).

The prevalence of food addiction using the 9-item modified Yale Food Addiction Scale (mYFAS) was less than one per cent (0.8%). Only two individuals met the diagnosis at baseline (Refer to Table 9.21).

### 10.3.5 The Association Between Variables

For smoking variables, the Spearman rho correlation coefficient was as shown in Table 9.2. There were a number of variables which were correlated such as FTND and CPD, age of smoking, CO level and baseline QSU-brief (p < 0.05).

For mood variables, the Spearman rho correlation coefficient between baseline HADS and BDI-II was $r_s = 0.557$, N = 256, p < 0.001.

For weight variables, weight was highly correlated with BMI, $r_s = 0.865$, N = 256, p < 0.001. As a result, BMI was replaced by weight in all eating variable analyses where a grouping of eating variables was required. The QCSRF questionnaire, which measured craving for sweet and rich foods, was found to correlate with the NEEDNT, a proxy measure for unhealthy food consumption, $r_s = 0.173$, N = 256, p < 0.001.
<table>
<thead>
<tr>
<th></th>
<th>FTND</th>
<th>CPD</th>
<th>Age Smoking</th>
<th># year smoking</th>
<th># quit attempt</th>
<th>CO level</th>
<th>WISDM- b</th>
<th>QSU-b</th>
<th>Live with smoker</th>
<th>Investigative treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTND</td>
<td>1</td>
<td>.515**</td>
<td>-.131*</td>
<td>.056</td>
<td>.002</td>
<td>.371**</td>
<td>-.094</td>
<td>.212**</td>
<td>.110</td>
<td>-.038</td>
</tr>
<tr>
<td>CPD</td>
<td>.515**</td>
<td>1</td>
<td>-.062</td>
<td>.207**</td>
<td>.024</td>
<td>.395**</td>
<td>-.052</td>
<td>.177**</td>
<td>.105</td>
<td>-.013</td>
</tr>
<tr>
<td>Age Smoking</td>
<td>-.131*</td>
<td>-.062</td>
<td>1</td>
<td>-.135*</td>
<td>.000</td>
<td>-.086</td>
<td>-.005</td>
<td>-.113</td>
<td>-.152’</td>
<td>-.032</td>
</tr>
<tr>
<td># year smoking</td>
<td>.056</td>
<td>.207**</td>
<td>-.135*</td>
<td>1</td>
<td>.046</td>
<td>.003</td>
<td>.015</td>
<td>-.039</td>
<td>-.076</td>
<td>-.001</td>
</tr>
<tr>
<td># quit attempt</td>
<td>.002</td>
<td>.024</td>
<td>.000</td>
<td>.046</td>
<td>1</td>
<td>-.021</td>
<td>-.023</td>
<td>.050</td>
<td>.046</td>
<td>-.041</td>
</tr>
<tr>
<td>CO level</td>
<td>.371**</td>
<td>.395**</td>
<td>-.086</td>
<td>.003</td>
<td>-.021</td>
<td>1</td>
<td>-.115</td>
<td>-.173”</td>
<td>.042</td>
<td>.004</td>
</tr>
<tr>
<td>WISDM- b</td>
<td>-.094</td>
<td>-.052</td>
<td>-.005</td>
<td>.015</td>
<td>-.023</td>
<td>-.115</td>
<td>1</td>
<td>.020</td>
<td>-.041</td>
<td>.138’</td>
</tr>
<tr>
<td>QSU-b</td>
<td>.212**</td>
<td>.177**</td>
<td>-.113</td>
<td>-.039</td>
<td>.050</td>
<td>-.173**</td>
<td>.020</td>
<td>1</td>
<td>.130’</td>
<td>-.031</td>
</tr>
<tr>
<td>Live with smoker</td>
<td>.110</td>
<td>.105</td>
<td>-.152’</td>
<td>-.076</td>
<td>.046</td>
<td>.042</td>
<td>-.041</td>
<td>.130’</td>
<td>1</td>
<td>-.026</td>
</tr>
<tr>
<td>Investigative treatment</td>
<td>-.038</td>
<td>-.013</td>
<td>-.032</td>
<td>-.001</td>
<td>-.041</td>
<td>.004</td>
<td>.138’</td>
<td>-.031</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
10.4 Follow-up Sample Description

10.4.1 Follow-up Retention

This section describes the role of depression and eating variables associated with follow-up retention, and determine predictors involved with follow-up retention in a smoking cessation program. Follow-up visits are described as EARLY (baseline and early follow-up) and LATE (baseline and late follow-up) (details in Section 8.9).

Of the 256 original participants, 116 (45.3%) attended only the baseline visit. A further 140 (54.7%) attended at least one other visit. Of these 140, 78 (55.7%) attended baseline, EARLY and LATE, 46 (32.9%) attended baseline and EARLY only, and 16 (11.4%) attended baseline and LATE only (Figure 10.2).

When follow-up visits were re-grouped into EARLY and LATE, 124 (48.4%) were categorised into EARLY and 94 (36.7%) were placed into LATE (Figure 9.1).

Figure 10.2: Sample recruitment and distribution
10.4.2 Characteristics of Participants Who Did Not Attend Any Follow-up (n =116)

All continuous variables were found to be normally distributed (one-sample Kolmogorov-Smirnov (1-KS) test, p > 0.05).

There were a number of demographic variables between those who attended follow-ups and those who attended the baseline interviews only (n =116): age (t =-4.60, p < 0.001), ethnicity ($X^2 =4.04$, df =1, p = 0.044) and employment ($X^2 =4.04$, df =1, p = 0.044). Participants who attended the baseline visit only were younger than those who attended any follow-ups (M =42.6 years, SD =12.8 vs M = 49.3 years, SD =10.6, p < 0.001); they were more likely to be from an ethnic minority (12.9% vs 5.7%); and they were not working at the time of interview (24.1% vs 14.3%). No differences were found for gender and education, p >0.05.

Participants who attended only the baseline assessment had a longer duration of smoking than those who attended any follow-ups (M = 32.9 years, SD = 10.7 vs. M = 26.6 year, SD =12.4; t = -4.42, p < 0.001). Participants who lived with another smoker were associated with attending only baseline visit (48.3%) compared with those who went to follow-ups (32.9%), $X^2 =6.29$, df =1, p = 0.012. No differences were found for other smoking variables, p > 0.05.

Those with a positive family history of depression were more likely to attend only the baseline assessment (see Table 10.3) while no other depression variable difference was found to be associated with follow-up visits.
Table 10.3: Comparison between depression and eating variables for those attending baseline visit only (n =116) compared to any follow-up (n =140)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline only n = 116 N (%)</th>
<th>Attended any follow-up n = 140 N (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HADS-D^a</td>
<td>1.6 (2.1)</td>
<td>1.9 (2.2)</td>
<td>0.240</td>
</tr>
<tr>
<td>BDI-II^a</td>
<td>4.8 (6.6)</td>
<td>4.9 (5.5)</td>
<td>0.976</td>
</tr>
<tr>
<td>Weight^a (kg)</td>
<td>79.8 (21.2)</td>
<td>80.0 (17.3)</td>
<td>0.942</td>
</tr>
<tr>
<td>QCSRF^a</td>
<td>18.4 (8.9)</td>
<td>17.8 (8.2)</td>
<td>0.623</td>
</tr>
<tr>
<td>NEEDNT^a</td>
<td>78.7 (51.6)</td>
<td>73.7 (40.2)</td>
<td>0.379</td>
</tr>
<tr>
<td>Family history</td>
<td></td>
<td></td>
<td>0.009*</td>
</tr>
<tr>
<td>- Yes</td>
<td>41 (35.3)</td>
<td>29 (20.7)</td>
<td></td>
</tr>
<tr>
<td>- No</td>
<td>75 (64.7)</td>
<td>111 (79.3)</td>
<td></td>
</tr>
<tr>
<td>Dep. History</td>
<td></td>
<td></td>
<td>0.170</td>
</tr>
<tr>
<td>- Yes</td>
<td>41 (35.3)</td>
<td>44 (31.4)</td>
<td></td>
</tr>
<tr>
<td>- No</td>
<td>75 (64.7)</td>
<td>96 (68.6)</td>
<td></td>
</tr>
<tr>
<td>mYFAS</td>
<td></td>
<td></td>
<td>0.894</td>
</tr>
<tr>
<td>- Yes</td>
<td>1 (0.9)</td>
<td>1 (0.9)</td>
<td></td>
</tr>
<tr>
<td>- No</td>
<td>115 (99.1)</td>
<td>139 (99.1)</td>
<td></td>
</tr>
</tbody>
</table>

^a = mean (SD), *p < 0.01

In summary, there were differences in age, ethnicity and employment for demographic variables. For smoking variables, living with another smoker (p = 0.012) and duration of smoking were found to be statistically significant (p < 0.001). However, only a family history of depression was found to be different between the two groups (p = 0.009). No differences were found for eating variables between participants who attended any follow-up and those who did not.

10.5 Retention in the Study

10.5.1 Characteristics of Participants at EARLY Follow-up (n =124)

A total of 124 (48.4%) participants attended EARLY follow-up compared to 132 (51.6%) who were lost to follow-up. A test for normality using the 1-KS test found age and the number of years of smoking to be statistically significant, p < 0.05, and therefore required analysis with a non-parametric test.

Using the Mann–Whitney U test, demographic differences for age (p < 0.001) were associated with EARLY follow-up. Chi-square test found employment status was also associated with EARLY follow-up (X^2 = 4.0, df = 1, p = 0.045). Participants who were lost to follow-up tended to be younger (M = 42.5, IQR = 20 years) and belonged to the group who were not employed at baseline (12.1%) when compared to those who
attended EARLY follow-up (6.6%). No association was found for gender, ethnicity and education between the two groups (p > 0.05) (Table 10.4). The mean duration to attend EARLY was 93 days (range 42-182, SD = 34.3 days) or roughly three months.

Those who were lost to follow-up tended to be those who had a shorter duration of lifetime smoking, median 27.5 (IQR = 20), compared to those attending EARLY follow-up, median 34.0 years (IQR = 14); p = 0.001 (Table 10.5). Living with another smoker was found to be associated with attendance at EARLY follow-up, $X^2 = 8.49$, df = 1, p = 0.004. There were more participants attending EARLY follow-up if no one was smoking at home, compared to participants lost to follow-up, (p =0.004).

No association was found between depression and eating variables and EARLY follow-up (Table 10.5).

In summary, only demographic variables (age, duration of smoking, employment status and living with another smoker) were found to be associated with EARLY follow-up. There were no depression or eating variables found to be associated with EARLY follow-up. The mean duration to attend EARLY was three months for those who attended follow-up visits.
Table 10.4: Association between demographic and smoking variables for EARLY (n =124) and lost to follow-up (n = 132)

<table>
<thead>
<tr>
<th>Variables</th>
<th>EARLY Retention</th>
<th>Lost to follow-up</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n =124 N (%)</td>
<td>n=132 N (%)</td>
<td></td>
</tr>
<tr>
<td>Agea</td>
<td>50.5 (14)</td>
<td>42.5 (20)</td>
<td>0.002*</td>
</tr>
<tr>
<td>Age of Smokingb</td>
<td>16.4 (4.7)</td>
<td>16.1 (4.3)</td>
<td>0.561</td>
</tr>
<tr>
<td>Number of years smokinga</td>
<td>34 (14)</td>
<td>27.5 (20)</td>
<td>0.001*</td>
</tr>
<tr>
<td>CPDb</td>
<td>19.8 (6.5)</td>
<td>20 (7.6)</td>
<td>0.795</td>
</tr>
<tr>
<td>Number of quit attemptsb</td>
<td>4.7 (9.4)</td>
<td>3.7 (4.2)</td>
<td>0.270</td>
</tr>
<tr>
<td>CO monitoringb</td>
<td>4.6 (1.3)</td>
<td>4.3 (1.2)</td>
<td>0.179</td>
</tr>
<tr>
<td>FTNDb</td>
<td>6.0 (1.8)</td>
<td>6.0 (1.8)</td>
<td>0.747</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>0.227</td>
</tr>
<tr>
<td>- Male</td>
<td>61 (49.2)</td>
<td>55 (41.7)</td>
<td></td>
</tr>
<tr>
<td>- Female</td>
<td>63 (50.8)</td>
<td>77 (58.3)</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td>0.070</td>
</tr>
<tr>
<td>- Caucasian/European</td>
<td>117 (94.4)</td>
<td>116 (87.9)</td>
<td></td>
</tr>
<tr>
<td>- Others</td>
<td>7 (5.6)</td>
<td>16 (12.1)</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td>0.543</td>
</tr>
<tr>
<td>- Tertiary</td>
<td>27 (21.8)</td>
<td>33 (25.0)</td>
<td></td>
</tr>
<tr>
<td>- Others</td>
<td>97 (78.2)</td>
<td>99 (75.0)</td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td>0.045***</td>
</tr>
<tr>
<td>- Not employed</td>
<td>17 (13.7)</td>
<td>31 (23.5)</td>
<td></td>
</tr>
<tr>
<td>- Employed</td>
<td>107 (86.3)</td>
<td>101 (76.5)</td>
<td></td>
</tr>
<tr>
<td>Living with another smoker</td>
<td></td>
<td></td>
<td>0.004**</td>
</tr>
<tr>
<td>- Yes</td>
<td>38 (30.6)</td>
<td>64 (48.5)</td>
<td></td>
</tr>
<tr>
<td>- No</td>
<td>86 (69.4)</td>
<td>68 (51.5)</td>
<td></td>
</tr>
</tbody>
</table>

a = Median (IQR), b = Mean (SD), *p < 0.01, **p < 0.005, *** p< 0.05
Table 10.5: Association between mood and eating variables for EARLY (n=124) and lost to follow-up (n = 132)

<table>
<thead>
<tr>
<th>Variables</th>
<th>EARLY Retention n=124 N (%)</th>
<th>Lost to follow-up n=132 N (%)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HADS-D&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.0 (2.2)</td>
<td>1.6 (2.1)</td>
<td>0.232</td>
</tr>
<tr>
<td>BDI-II&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.6 (5.3)</td>
<td>5.0 (6.5)</td>
<td>0.585</td>
</tr>
<tr>
<td>Weight&lt;sup&gt;a&lt;/sup&gt; (kg)</td>
<td>79.1 (16.9)</td>
<td>80.7 (21.0)</td>
<td>0.502</td>
</tr>
<tr>
<td>QCSRF&lt;sup&gt;a&lt;/sup&gt;</td>
<td>17.8 (8.0)</td>
<td>18.4 (9.0)</td>
<td>0.527</td>
</tr>
<tr>
<td>NEEDNT&lt;sup&gt;a&lt;/sup&gt;</td>
<td>73.8 (41.5)</td>
<td>78.6 (49.7)</td>
<td>0.421</td>
</tr>
<tr>
<td>Family history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Yes</td>
<td>27 (21.8)</td>
<td>43 (32.6)</td>
<td>0.053</td>
</tr>
<tr>
<td>- No</td>
<td>97 (78.2)</td>
<td>89 (67.4)</td>
<td></td>
</tr>
<tr>
<td>Dep. History</td>
<td></td>
<td></td>
<td>0.229</td>
</tr>
<tr>
<td>- Yes</td>
<td>39 (31.5)</td>
<td>51 (38.6)</td>
<td></td>
</tr>
<tr>
<td>- No</td>
<td>85 (68.5)</td>
<td>81 (61.4)</td>
<td></td>
</tr>
<tr>
<td>mYFAS</td>
<td></td>
<td></td>
<td>0.965</td>
</tr>
<tr>
<td>- Yes</td>
<td>1 (0.8)</td>
<td>1 (0.8)</td>
<td></td>
</tr>
<tr>
<td>- No</td>
<td>123 (99.2)</td>
<td>131 (99.2)</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> = Mean (SD)

10.5.2 Characteristics of Participants at LATE Follow-up (n = 94)

A total of 94 (36.7%) participants attended LATE follow-ups compared to 162 (63.3%) who were lost to follow-up. Test for normality using the 1-KS test reported age and lifetime smoking duration not to be normally distributed, p < 0.05. Both variables were therefore analysed using a non-parametric test.

Using Mann-Whitney U test, differences were found for both age and lifetime smoking duration between the two groups (p < 0.001) (Table 10.6). Participants who were older and those with a longer lifetime duration of smoking were found to be associated with attending LATE follow-ups. No differences were found for mood and eating variables (p >0.05). The mean duration to attend a LATE was 380 days (range 196-664, SD = 84.0 days) or just over a year.

In summary, only age and lifetime smoking duration were found to be associated with LATE follow-ups. No association was found for depression and eating variables; and the mean duration to attend a LATE follow-up was one year.
Table 10.6: Association between demographic and smoking variables for LATE (n = 94) and lost to follow-up (n = 162)

<table>
<thead>
<tr>
<th>Variables</th>
<th>LATE Retention</th>
<th>Lost to follow-up</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=94 N (%)</td>
<td>n=162 N (%)</td>
<td></td>
</tr>
<tr>
<td>Age(^a)</td>
<td>51 (15.3)</td>
<td>44 (20)</td>
<td>0.000*</td>
</tr>
<tr>
<td>Age of Smoking(^b)</td>
<td>15.9 (4.3)</td>
<td>16.4 (4.6)</td>
<td>0.936</td>
</tr>
<tr>
<td>Number of years smoking(^a)</td>
<td>35 (14)</td>
<td>28 (18)</td>
<td>0.000*</td>
</tr>
<tr>
<td>CPD(^b)</td>
<td>18.8 (6.5)</td>
<td>20.5 (7.3)</td>
<td>0.380</td>
</tr>
<tr>
<td>Number of quit attempts(^b)</td>
<td>4.3 (4.0)</td>
<td>4.1 (8.5)</td>
<td>0.196</td>
</tr>
<tr>
<td>CO monitoring(^b)</td>
<td>4.4 (1.3)</td>
<td>4.5 (1.3)</td>
<td>1.000</td>
</tr>
<tr>
<td>FTND(^b)</td>
<td>5.7 (1.7)</td>
<td>6.2 (1.8)</td>
<td>0.378</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>0.054</td>
</tr>
<tr>
<td>- Male</td>
<td>50 (53.2)</td>
<td>66 (40.7)</td>
<td>0.118</td>
</tr>
<tr>
<td>- Female</td>
<td>44 (46.8)</td>
<td>96 (59.3)</td>
<td>0.062</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Caucasian/Europea</td>
<td>89 (94.7)</td>
<td>144 (88.9)</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>5 (5.3)</td>
<td>18 (11.1)</td>
<td></td>
</tr>
<tr>
<td>- Others</td>
<td></td>
<td></td>
<td>0.062</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Tertiary</td>
<td>19 (20.2)</td>
<td>41 (25.3)</td>
<td></td>
</tr>
<tr>
<td>- Others</td>
<td>75 (79.8)</td>
<td>121 (74.7)</td>
<td></td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td>0.062</td>
</tr>
<tr>
<td>- Not employed</td>
<td>12 (12.8)</td>
<td>36 (22.2)</td>
<td></td>
</tr>
<tr>
<td>- Employed</td>
<td>82 (87.2)</td>
<td>126 (77.8)</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) = Median (IQR), \(^b\) = Mean (SD), *p < 0.001

10.5.3 Predictors for EARLY and LATE Follow-up

This study also attempted to determine possible predictors in both depression and eating variables for both EARLY and LATE follow-ups in a smoking cessation program.

Logistic regression analysis was conducted using four groups of variables (demographic, smoking status, depression and eating). The analysis identified six independent predictors for retention at EARLY follow-up from the respective models: age (p < 0.001), employment (p =0.008), living with another smoker (p = 0.009), duration of smoking (p < 0.001), positive family history of depression (p =0.035), and HADSD (p = 0.031) (Tables 10.7, 10.8 and 10.9).

Logistic regression for LATE follow-up models, also showed age (p <0.001), employment (p=0.013) and smoking duration (p < 0.001) as significant predictors.
Other predictors found were gender ($p= 0.048$), and the number of cigarettes smoked ($p= 0.046$) (Tables 10.7 and 10.8).

For depression variables, groupings were done with depression symptoms scores and diagnosis for BDI-II and HADS separately i.e. four separate models for EARLY and LATE follow-ups. These models were found to be unstable ($p >0.05$). A separate model using both HADSD and BDI-II symptom scores was found to be reliable for EARLY retention, $X^2 = 10.00$, $df = 4$, $p < 0.05$; but not LATE retention (Table 10.9).

None of the models using eating variables grouping were found to be reliably able to distinguish between predictors and grouping ($p > 0.05$) (Table 10.10).

### 10.5.4 Stepwise Logistic Regression for EARLY Follow-up

When these independent predictors were grouped together, using a stepwise logistic regression analysis showed the model grouping age, employment and living with another smoker to be reliable, $X^2 = 30.48$, $df = 3$, $p < 0.001$. Inclusion of the remaining three predictors resulted in an unreliable model and predictors were found not to be statistically significant ($p > 0.05$). Stepwise logistic regression also showed age to be the strongest predictor where an increase in one score (1 year) increased non-attendance at EARLY, Exp (B) = 1.04 (95% CI = 1.02 - 1.07). Participants who were not employed at baseline were also found to attend EARLY, Exp (B) = 0.34 (95% CI = 0.17 - 0.71), while living with another smoker increased the odds by 2.02 (95% CI = 1.18 - 3.46) of not attending EARLY.

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Follow-up</th>
<th>Early</th>
<th>Late</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>Wald</td>
</tr>
<tr>
<td>Age</td>
<td>0.49</td>
<td>0.012</td>
<td>16.703</td>
</tr>
<tr>
<td>Gender</td>
<td>0.316</td>
<td>0.267</td>
<td>1.405</td>
</tr>
<tr>
<td>Race</td>
<td>0.639</td>
<td>0.491</td>
<td>1.692</td>
</tr>
<tr>
<td>Employment</td>
<td>-0.976</td>
<td>0.369</td>
<td>7.003</td>
</tr>
<tr>
<td>Education</td>
<td>-0.079</td>
<td>0.318</td>
<td>0.062</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.886</td>
<td>0.725</td>
<td>15.853</td>
</tr>
</tbody>
</table>

$X^2 = 27.056$ $p = 0.000$
Nagelkerke’s $R^2 = 0.134$
N =256

$X^2 = 27.058$ $p = 0.000$
Nagelkerke’s $R^2 = 0.137$
N = 256

* $P < 0.001$, ** $p < 0.05$
### Table 10.8: Smoking predictors of follow-up

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Early B</th>
<th>SE</th>
<th>Wald</th>
<th>P value</th>
<th>(Exp)B</th>
<th>Late B</th>
<th>SE</th>
<th>Wald</th>
<th>P value</th>
<th>(Exp)B</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPD</td>
<td>0.018</td>
<td>0.023</td>
<td>0.632</td>
<td>0.427</td>
<td>0.982</td>
<td>-0.049</td>
<td>0.025</td>
<td>3.964</td>
<td>0.046**</td>
<td>0.952</td>
</tr>
<tr>
<td>Living with smoker</td>
<td>0.734</td>
<td>0.280</td>
<td>6.875</td>
<td>0.009**</td>
<td>2.084</td>
<td>-0.0297</td>
<td>0.293</td>
<td>1.029</td>
<td>0.310</td>
<td>0.743</td>
</tr>
<tr>
<td>Initiation age</td>
<td>0.021</td>
<td>0.030</td>
<td>0.474</td>
<td>0.491</td>
<td>1.021</td>
<td>-0.021</td>
<td>0.033</td>
<td>0.398</td>
<td>0.528</td>
<td>0.980</td>
</tr>
<tr>
<td>#years smoke</td>
<td>0.044</td>
<td>0.012</td>
<td>13.114</td>
<td>0.000*</td>
<td>1.045</td>
<td>0.055</td>
<td>0.013</td>
<td>17.750</td>
<td>0.000*</td>
<td>1.056</td>
</tr>
<tr>
<td>FTND</td>
<td>0.010</td>
<td>0.090</td>
<td>0.013</td>
<td>0.909</td>
<td>1.010</td>
<td>-0.077</td>
<td>0.094</td>
<td>0.677</td>
<td>0.411</td>
<td>0.926</td>
</tr>
<tr>
<td>#quit attempts</td>
<td>0.024</td>
<td>0.026</td>
<td>0.856</td>
<td>0.355</td>
<td>1.025</td>
<td>0.002</td>
<td>0.020</td>
<td>0.123</td>
<td>0.797</td>
<td>1.002</td>
</tr>
<tr>
<td>Investigative treatment</td>
<td>0.094</td>
<td>0.267</td>
<td>0.123</td>
<td>0.726</td>
<td>1.098</td>
<td>0.259</td>
<td>0.279</td>
<td>0.86</td>
<td>0.354</td>
<td>1.295</td>
</tr>
<tr>
<td>QSU-brief</td>
<td>0.03</td>
<td>0.012</td>
<td>0.066</td>
<td>0.797</td>
<td>1.003</td>
<td>0.005</td>
<td>0.013</td>
<td>0.156</td>
<td>0.693</td>
<td>1.005</td>
</tr>
<tr>
<td>Brief WISDM</td>
<td>0.017</td>
<td>0.012</td>
<td>2.098</td>
<td>0.148</td>
<td>0.983</td>
<td>-0.015</td>
<td>0.013</td>
<td>0.347</td>
<td>0.246</td>
<td>0.986</td>
</tr>
<tr>
<td>Constant</td>
<td>1.260</td>
<td>1.070</td>
<td>1.385</td>
<td>0.239</td>
<td>0.284</td>
<td>0.103</td>
<td>1.137</td>
<td>0.008</td>
<td>0.928</td>
<td>1.109</td>
</tr>
</tbody>
</table>

$X^2 = 26.694 \ p = 0.002$

Nagelkerke’s $R^2 = 0.132$

N = 256

* $P < 0.001$, ** $p < 0.05$

### Table 10.9: Mood predictors of follow-up

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Early B</th>
<th>SE</th>
<th>Wald</th>
<th>P value</th>
<th>(Exp)B</th>
<th>Late B</th>
<th>SE</th>
<th>Wald</th>
<th>P value</th>
<th>(Exp)B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family history</td>
<td>0.621</td>
<td>0.294</td>
<td>4.467</td>
<td>0.035**</td>
<td>1.861</td>
<td>0.424</td>
<td>0.304</td>
<td>1.938</td>
<td>0.164</td>
<td>1.528</td>
</tr>
<tr>
<td>Dep history</td>
<td>0.280</td>
<td>0.272</td>
<td>1.059</td>
<td>0.304</td>
<td>1.323</td>
<td>0.127</td>
<td>0.279</td>
<td>0.207</td>
<td>0.649</td>
<td>1.135</td>
</tr>
<tr>
<td>HADS</td>
<td>0.172</td>
<td>0.080</td>
<td>4.656</td>
<td>0.031**</td>
<td>1.188</td>
<td>0.048</td>
<td>0.078</td>
<td>0.379</td>
<td>0.538</td>
<td>1.049</td>
</tr>
<tr>
<td>BDI-II</td>
<td>-0.044</td>
<td>0.029</td>
<td>2.209</td>
<td>0.137</td>
<td>0.957</td>
<td>-0.013</td>
<td>0.029</td>
<td>0.218</td>
<td>0.641</td>
<td>0.987</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.794</td>
<td>0.348</td>
<td>5.199</td>
<td>0.023</td>
<td>0.452</td>
<td>-0.961</td>
<td>0.358</td>
<td>7.222</td>
<td>0.007</td>
<td>0.382</td>
</tr>
</tbody>
</table>

$X^2 = 10.00 \ p = 0.040$

Nagelkerke’s $R^2 = 0.051$

N = 256

* $P < 0.001$, ** $p < 0.05$
Table 10.10: Eating predictors of follow-up

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Follow-up</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>SE</td>
<td>Wald</td>
<td>P value</td>
<td>(Exp)B</td>
<td>B</td>
<td>SE</td>
<td>Wald</td>
<td>P value</td>
<td>(Exp)B</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.005</td>
<td>0.007</td>
<td>0.551</td>
<td>0.458</td>
<td>0.995</td>
<td>0.07</td>
<td>0.07</td>
<td>1.012</td>
<td>0.314</td>
<td>1.007</td>
<td></td>
</tr>
<tr>
<td>mYFAS</td>
<td>-0.219</td>
<td>1.460</td>
<td>0.022</td>
<td>0.881</td>
<td>0.804</td>
<td>-0.910</td>
<td>1.471</td>
<td>0.383</td>
<td>0.536</td>
<td>0.403</td>
<td></td>
</tr>
<tr>
<td>QCSRIF</td>
<td>-0.008</td>
<td>0.016</td>
<td>0.242</td>
<td>0.623</td>
<td>0.992</td>
<td>-0.013</td>
<td>0.017</td>
<td>0.589</td>
<td>0.443</td>
<td>0.987</td>
<td></td>
</tr>
<tr>
<td>NEEDNT</td>
<td>-0.002</td>
<td>0.003</td>
<td>0.455</td>
<td>0.500</td>
<td>0.998</td>
<td>-0.000</td>
<td>0.003</td>
<td>0.016</td>
<td>0.898</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>1.837</td>
<td>1.627</td>
<td>0.265</td>
<td>0.607</td>
<td>2.309</td>
<td>-0.009</td>
<td>1.647</td>
<td>0.000</td>
<td>0.995</td>
<td>1.010</td>
<td></td>
</tr>
</tbody>
</table>

X² = 1.401 p = 0.844
Nagelkerke’s R² = 0.007
N = 256

10.5.5 Stepwise Logistic Regression for LATE Follow-up

The five independent predictors (age, employment, smoking duration, gender and CPD) were grouped, and the logistic regression model was found to be reliable: X² = 37.70, df = 5, p < 0.001; however, Nagelkerke’s R² = 0.19. This model found three predictors to be statistically significant: gender, employment status and number of cigarettes smoked at baseline (p <0.05). When duration of lifetime smoking was included in a separate model, it was found equally reliable, X² = 37.70, df = 4, p < 0.001.

Stepwise logistic regression found an increased score for duration of lifetime smoking by one (1 year) increased the odds by 1.07 (95% CI = 1.02 – 2.00), and being male increased the odds by two times (95% CI = 1.14 – 3.61) of not attending follow-up at LATE. A reduction of one score (1 cigarette), and not being employed, was predictive of less likely not to attend LATE by odds of 0.93 (95% CI = 0.89 - 0.98) and 0.40 (95% CI =0.18 - 0.88), respectively.

10.5.6 Summary

To summarise, increasing age and living with another smoker predicted non-retention, while not being employed predicted retention among the EARLY follow-up. For LATE follow-up, being male and longer duration of lifetime smoking predicted non-retention for LATE and reducing cigarette use while not employed predicted retention. No depression or eating variables were found to predict retention for both EARLY and LATE follow-up.
10.6 Smoking Cessation Outcome

The SCeMES-QN was primarily interested in investigating the association between depression and eating variables, both individually and together, and their association with the outcomes of smoking cessation – either being abstinent or still smoking. In this study, attempts were also made to determine predictors from both depression and eating variables which might affect the quit attempt.

Additionally, this study attempted to determine the smoking quit rate, and the prevalence of depression and food addiction for both EARLY and LATE follow-up. The trends of weight gain and smoking cessation outcome were also investigated.

10.6.1 Smoking Cessation Outcome on Follow-up

The main outcome for the SCeMES-QN was the quit status of participants, – either abstinent or still smoking. The 7-day point prevalence was used to define the abstinent group. All others were automatically defined as still smoking. Abstinent participants did not smoke even a puff of a cigarette during the seven days prior to when measurement was taken. Abstinence was further verified with the CO recording. Those who were lost to follow-up were included in the still smoking group.

For participants who attended EARLY follow-up, which included regrouping both visits 2 and 3, the CO verified quit rate was found to be 14.5% (n=37). For participants who attended LATE follow-up, which included regrouping visits 4 and 5, the CO verified quit rates was 14.8% (n=38).

10.7 Mood

For the SCeMES-QN, the term mood in the acronym SCeMES referred mainly to the status of depression in the participants. The diagnosis of depression was made using the agreed cut-off scores for both the HADS and the BDI-II, determined to be >7 and >16 respectively. This study investigated the prevalence of depression in smokers wanting to quit smoking, and their trend over the course of the program. The study was also interested in investigating the associating factors between the depression variables and smoking cessation outcomes; and determining variables which may influence the outcomes.
10.7.1 Depression Diagnosis and Quit status

Table 10.11 illustrates the prevalence of depression at each follow-up visit. Baseline depression was reported as 2.3% to 6.6% depending on the instrument used for detection. In general the BDI-II showed a much higher figure of those with depression across all visits except the final visit. A number of participants did not answer the BDI-II questionnaire at visit five.

Table 10.11: Prevalence of depression at four visits

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Baseline n (%), 256</th>
<th>Visit Two n (%), 103</th>
<th>Visit Three n (%), 67</th>
<th>Visit Four n (%), 49</th>
<th>Visit Five n (%), N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Anxiety Depression Scale-D (cut-off &gt;7)</td>
<td>6 (2.3)</td>
<td>3 (2.9)</td>
<td>2 (3.0)</td>
<td>1 (2.0)</td>
<td>1 (1.3), 79</td>
</tr>
<tr>
<td>Beck Depression Inventory-II (cut-off &gt;16)</td>
<td>17 (6.6)</td>
<td>5 (4.9)</td>
<td>5 (7.5)</td>
<td>3 (6.1)</td>
<td>0 (0), 38</td>
</tr>
</tbody>
</table>

10.7.2 Depression Diagnosis at EARLY and LATE Follow-up Visits

The prevalence of depression measured, using both measurements, are shown in Table 10.12. Overall, there was a trend of improving depression at both follow-up visits. This trend was also seen for depression scores on both instruments.

Table 10.12: Prevalence of depression for EARLY and LATE follow-up

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Baseline n (%), 256</th>
<th>Early n (%), 124</th>
<th>Late n (%), N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital Anxiety Depression Scale (cut-off &gt;7)</td>
<td>6 (2.3)</td>
<td>4 (3.2)</td>
<td>1 (1.0), 94</td>
</tr>
<tr>
<td>Beck Depression Inventory-II (cut-off &gt;16)</td>
<td>17 (6.6)</td>
<td>8 (6.5)</td>
<td>2 (3.6), 55</td>
</tr>
</tbody>
</table>

As shown in Figure 10.2, there was an improvement for the HADSD score from baseline (M = 1.94, SD = 2.20) to EARLY follow-up (M = 1.41, SD = 2.15) of 0.53, which was statistically significant on paired t-test (t (123) = 2.54, p = 0.012). Similarly, an improvement in score was also seen between baseline (M = 1.81, SD = 2.05) and LATE follow-up (M = 1.24, SD = 1.98) HADSD scores by 0.57, the difference being statistically significant (t (93) = 2.29, p = 0.024). In Table 10.12, improvement in the score by 0.03 was also found for the BDI-II instrument from baseline (M = 4.63, SD = 5.34) to EARLY follow-up (M = 4.60, SD = 5.67); however, this was not found to be
statistically significant (t (123) = 0.05, p = 0.959). There was a greater improvement for baseline (M = 4.53, SD = 5.33) and LATE follow-up (M = 3.15, SD = 5.03) BDI-II scoring of 1.38 scores. However, this too was not statistically significant (t (55) = 1.90, p = 0.06).

Although there was a change between total mean scores from baseline to EARLY, and baseline to LATE follow-ups for the HADSD, both EARLY and LATE scores were not found to be statistically significant: F (1, 121) = 3.38, P > 0.05 and F (1, 91) = 1.14, p > 0.05.

* p = 0.012 ** p = 0.024

**Figure 10.1: HADSD mean score trend between baseline and follow-ups**

### 10.7.3 Baseline Mood and Smoking Cessation Outcomes

There was no difference in mood variables between those who quit and those who were smoking at EARLY and LATE using 1-KS test (p > 0.05).

On independent t-test, no association between the means of both HADSD and BDI-II at baseline and quit smoking outcomes at EARLY (p > 0.05) were found. There was also no association between quit smoking outcomes and smoking to relieve negative mood using the WISDM subset for affect (p > 0.05) (Table 9.13). When both HADSD and BDI-II were used to detect presence or absence of depression, chi-square test found no association with EARLY quit smoking outcomes, p > 0.05.

Analysis using the subset for WISDM-brief which assesses for affective enhancement also found no association with EARLY quit smoking outcomes, p > 0.05.
No association was found between mood variables and LATE quit smoking outcomes \( (p > 0.05) \) (Table 10.13). When both HADS-D and BDI-II were used as diagnostic tools for presence or absence of depression, no association was found between depression diagnoses and LATE quit smoking outcomes \( (P > 0.05) \). The subset for WISDM-Affect was also not found to be associated with LATE quit smoking outcomes \( (p > 0.05) \).

Logistic regression was not tested, as no variables in both follow-up periods were found to be associated with a smoking cessation outcome in this study.

Table 10.13: Association between baseline mood variables and EARLY \( (n = 124) \) quit smoking outcome and LATE \( (n=94) \)

<table>
<thead>
<tr>
<th>Follow-up</th>
<th>EARLY</th>
<th>LATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
<td>Abstinent ( n=36 )</td>
<td>Smoking ( n=88 )</td>
</tr>
<tr>
<td>HADSD(^a)</td>
<td>1.8 (1.8)</td>
<td>2.0 (2.3)</td>
</tr>
<tr>
<td>BDI-II(^a)</td>
<td>4.3 (5.1)</td>
<td>4.8 (5.4)</td>
</tr>
<tr>
<td>WISDM-Affect(^a)</td>
<td>4.3 (1.5)</td>
<td>4.4 (1.7)</td>
</tr>
<tr>
<td>Family history</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10 (27.8)</td>
<td>17 (19.3)</td>
</tr>
<tr>
<td>No</td>
<td>26 (72.2)</td>
<td>71 (80.7)</td>
</tr>
<tr>
<td>Dep. History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9 (25.0)</td>
<td>30 (34.1)</td>
</tr>
<tr>
<td>No</td>
<td>27 (75.0)</td>
<td>58 (65.9)</td>
</tr>
</tbody>
</table>

\(^a\) = Mean (SD) Dep. = Depression

9.6.4 Summary

In summary, no association was found between depression and smoking cessation outcomes at both EARLY and LATE follow-ups. Logistic regression models for both EARLY and LATE depression variables were not tested as no variables were found to be significant.

10.8 Eating

The SCeMES-QN attempted to investigate the trend of eating variables, in particular weight and food addiction at EARLY and LATE follow-ups. The eating variables were also investigated to determine any association with smoking cessation outcomes at
both follow-up periods. Finally, predictors at both EARLY and LATE follow-ups for eating variables were also investigated.

10.8.1 Weight Status on Follow-up

Figure 10.3 below illustrates the mean weight increase over time from baseline to EARLY and also LATE follow-ups. During the same period both QCSRF and NEEDNT scores decreased as shown in both Figures 9.4 and 9.5.

![Weight Status on Follow-up](image)

*\( p < 0.001 \)

Figure 10.2: Mean weight at baseline, EARLY and LATE follow-up

<table>
<thead>
<tr>
<th>Pair</th>
<th>Mean</th>
<th>SD</th>
<th>t-test</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline weight – EARLY weight (kg)</td>
<td>-1.83</td>
<td>2.60</td>
<td>-7.62</td>
<td>0.000**</td>
</tr>
<tr>
<td>Baseline weight – LATE weight (kg)</td>
<td>-3.03</td>
<td>4.62</td>
<td>-6.11</td>
<td>0.000**</td>
</tr>
<tr>
<td>Baseline QCSRF – EARLY QCSRF score</td>
<td>0.42</td>
<td>7.74</td>
<td>0.60</td>
<td>0.547</td>
</tr>
<tr>
<td>Baseline QCSRF-LATE QCSRF score</td>
<td>3.16</td>
<td>8.42</td>
<td>2.79</td>
<td>0.007*</td>
</tr>
<tr>
<td>Baseline NEEDNT- EARLY NEEDNT score</td>
<td>1.26</td>
<td>41.97</td>
<td>0.33</td>
<td>0.739</td>
</tr>
<tr>
<td>Baseline NEEDNT- LATE NEEDNT score</td>
<td>9.69</td>
<td>42.14</td>
<td>1.71</td>
<td>0.094</td>
</tr>
</tbody>
</table>

*\( P < 0.01, \) **\( P < 0.001 \)

The mean score change of 1.85 kg over a period of three months between baseline (M =79.33, SD = 16.91) and EARLY follow-up (M = 81.15, SD = 17.26) was found to be statistically significant as shown by the paired t-test, \( t(118) = -7.62, p < 0.001 \). In
addition, an increase of 3.03 kg from baseline (M = 82.01, SD = 17.26) to LATE follow-up (M = 85.05, SD = 17.86) also showed the mean score change to be statistically significant using the paired t-test, (t (87) = -6.11, p < 0.001). Therefore, there was a noticeably increasing trend for mean weight gain over time for participants of the SCeMES.

For both NEEDNT and the QSCRF, the mean score changes between baseline and EARLY, and baseline and LATE, were to reduce over time. However, only the change between baseline (M = 17.15, SD = 8.67) and LATE follow-up (M = 13.98, SD = 5.51) for the QSCRF of -3.17 was found to be statistically significant (t (55) = 2.79, p = 0.007) on the paired t-test (Table 10.14). The change between scores for the QSCRF from baseline (M = 17.75, SD = 7.98) to EARLY follow-up (M = 17.33, SD = 7.35) of -0.42 was found not to be statistically significant on t-test (t (124) = 0.60, p = 0.547). Using a similar analysis for the NEEDNT, the improving change in score of – 4.1 from baseline (M = 73.58, SD = 41.40) to EARLY follow-up (M = 73.32, SD = 46.67) was not statistically significant (t (124) = 0.33, p = 0.739). At LATE follow-up, a similar improving trend was also found not to be statistically significant (p = 0.094) (Table 10.14, Figures 10.4 and 10.5).

* P < 0.05

**Figure 10.3: Mean score QSCRF for baseline, EARLY and LATE follow-up**
Figure 10.3 illustrated that the mean weight between baseline and subsequent follow-ups was indeed increasing over time and found to be statistically significant at \( p < 0.001 \). When the sample was separated according to their quit smoking outcomes, an increase was also found in both the abstinent group and also in those still smoking (Figures 10.6 and 10.7).

For EARLY follow-up, those who were abstinent gained more weight rapidly, 3.3 kg in the first three months, while those who were smoking were found to gain 1.1 kg over the same period. This increase was found to be statistically significant using univariate ANOVA at \( p < 0.001 \) (Figure 10.6).

This weight gain was found to continue for LATE follow-up quit smoking outcome; however, the gain was not as rapid. Those participants who were abstinent were found to have a mean weight gain of 4.5kg after a year. For participants who still did not quit at the LATE follow-up period, the weight gain was 1.8kgs. Similar to EARLY follow-up, this was found to be statistically significant, \( F (1, 84) =8.35, p = 0.005 \) (Figure 10.7). Baseline weight was highly correlated to weight at LATE follow-up, \( r_s = 0.946 \).
* P < 0.001

Figure 10.5: Baseline and EARLY weight (kgs) and quit smoking outcome

* P < 0.01, ** P < 0.001

Figure 10.6: Baseline and LATE weight (kgs) and quit smoking outcome

10.8.3 Association between Eating Variables and EARLY (n = 124) Quit Status

Testing for normality of distribution found no differences between the two groups at EARLY and LATE follow-ups (p > 0.05).

Data analysed showed no association was found between baseline weight variables and EARLY follow-up quit status (p > 0.05). Those who smoked to control weight
based on the WISDM subset were not found to be associated with smoking status at EARLY follow-up (p > 0.05). They were as likely to be abstinent compared to smoking at three months (Table 10.15).

No association was found between eating variables and LATE quit smoking outcomes (Table 10.15). Similarly, when WISDM-Weight subscale was analysed against LATE quit smoking outcomes, no association was found (t1.25, p > 0.05).

Logistic regression was not tested as no variables in both follow-up periods were found to be associated with the smoking cessation outcome in this study.

Table 10.15 Association between baseline eating variables and EARLY quit smoking outcome

<table>
<thead>
<tr>
<th>Follow-up</th>
<th>Abstinent (n=36)</th>
<th>Smoking (n=88)</th>
<th>P value</th>
<th>Abstinent (n=38)</th>
<th>Smoking (n=56)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>76.3 (12.5)</td>
<td>80.3 (18.3)</td>
<td>0.230</td>
<td>80.1 (16.5)</td>
<td>81.6 (17.8)</td>
<td>0.501</td>
</tr>
<tr>
<td>QCSRF</td>
<td>19.7 (10.5)</td>
<td>16.9 (6.6)</td>
<td>0.078</td>
<td>17.6 (9.5)</td>
<td>17.5 (7.1)</td>
<td>0.947</td>
</tr>
<tr>
<td>NEEDNT</td>
<td>78.6 (46.4)</td>
<td>71.5 (31.3)</td>
<td>0.394</td>
<td>75.7 (39.7)</td>
<td>75.5 (42.1)</td>
<td>0.979</td>
</tr>
<tr>
<td>WISDM-Weight</td>
<td>2.4 (1.5)</td>
<td>2.9 (1.8)</td>
<td>0.215</td>
<td>2.6 (1.6)</td>
<td>2.8 (1.9)</td>
<td>0.530</td>
</tr>
<tr>
<td>mYFAS(a)</td>
<td></td>
<td>0.290</td>
<td></td>
<td></td>
<td></td>
<td>0.222</td>
</tr>
<tr>
<td>Yes</td>
<td>1 (2.8)</td>
<td>0 (0.0)</td>
<td></td>
<td>1 (2.6)</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>35 (97.2)</td>
<td>88 (100.0)</td>
<td></td>
<td>37 (97.4)</td>
<td>56 (100.0)</td>
<td></td>
</tr>
</tbody>
</table>

\(a = N (\%)\)

10.8.4 Food Addiction Status on Follow-up

The modified-YFAS questionnaire was used to detect cases of food addiction in the sample over the data collection period. As shown in Table 10.16, there were no significant cases detected over the study period of five visits. When visits were regrouped to EARLY and LATE follow-up, no cases were detected at EARLY follow-up on analysis. For LATE follow-up, only one case (1.1%) was detected.
Table 10.16: Diagnosis of food addiction at each visit

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Baseline n, (%)</th>
<th>Visit Two n, (%)</th>
<th>Visit Three n, (%)</th>
<th>Visit Four n, (%)</th>
<th>Visit Five n, (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yale Food Addiction Score (YFAS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (0.8)</td>
<td>2 (1.9)</td>
<td>0 (0.0)</td>
<td>1 (2.0)</td>
<td>1 (1.3), 79</td>
</tr>
</tbody>
</table>

10.8.5 Summary

In summary, overall, participants gained weight from baseline at both EARLY and LATE follow-ups by 1.3kg and 5.1kg respectively and this was statistically significant (p<0.001). Contrary to expectations, there was an improvement in overall scores for both craving for sweet and rich foods, and consumption of foods which were energy dense but nutritionally deficient. However, only the QCSRF score change from baseline to LATE follow-up was statistically significant (p<0.05).

For participants who were both abstinent or not at follow-ups, the trend of weight gain was found. Participants who were abstinent, however, gained more weight at both three months and one year compared to those who were still smoking at the time of recording (p<0.01).

No association was found between eating variables and smoking cessation outcome at both EARLY and LATE follow-ups. Logistic regression models for both EARLY and LATE depression variables were not tested as no variables were found to be significant.

This study found no increase in food addiction diagnosis using the mYFAS at three months and at one year.

10.9 The Association between Mood, Weight and Smoking Cessation

10.9.1 The Association between Depression, Eating and Quit Smoking Outcomes

There was no correlation between weight at baseline and depression at EARLY ($r_s = 0.88$, $N = 124$, $p = 0.322$) or LATE ($r_s = 0.05$, $N = 94$, $p = 0.961$) follow-ups using Spearman rho correlation coefficient. There was also no correlation detected between weight at EARLY and mood at LATE ($r_s = -0.51$, $N = 76$, $p = 0.664$).
10.9.2 Predictors between Depression and Weight towards Quit Smoking Outcomes

Both depression and weight variables at baseline were grouped as a single model to predict for both EARLY and LATE quit smoking outcomes. Both models were found to be unreliably able to assess if mood and weight variables together were able to distinguish between being abstinent or smoking at EARLY follow-up, $X^2 = 10.28$, df = 9, $p = 0.329$ (Table 10.17) and LATE, $X^2 = 9.45$, df = 9, $p = 0.397$ (Table 10.18). Therefore, when all mood and weight variables were grouped as a model, no predictors were found.

Table 10.17: Logistic regression for mood and eating and EARLY quit smoking outcome

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
<th>95% C.I. for EXP(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight</td>
<td>-.014</td>
<td>.013</td>
<td>1.054</td>
<td>1</td>
<td>.305</td>
<td>.987</td>
<td>.961    1.012</td>
</tr>
<tr>
<td>QCSRFTotal</td>
<td>.052</td>
<td>.029</td>
<td>3.336</td>
<td>1</td>
<td>.068</td>
<td>1.054</td>
<td>.996    1.115</td>
</tr>
<tr>
<td>NEEDNTtotal</td>
<td>.003</td>
<td>.005</td>
<td>.236</td>
<td>1</td>
<td>.627</td>
<td>1.003</td>
<td>.992    1.013</td>
</tr>
<tr>
<td>HADSD</td>
<td>-.098</td>
<td>.134</td>
<td>.535</td>
<td>1</td>
<td>.464</td>
<td>.907</td>
<td>.697    1.179</td>
</tr>
<tr>
<td>BDItotalDep</td>
<td>-.019</td>
<td>.055</td>
<td>.121</td>
<td>1</td>
<td>.727</td>
<td>.981</td>
<td>.880    1.093</td>
</tr>
<tr>
<td>HxDepression(1)</td>
<td>.511</td>
<td>.472</td>
<td>1.171</td>
<td>1</td>
<td>.279</td>
<td>1.667</td>
<td>.661    4.204</td>
</tr>
<tr>
<td>FamilyhxBinary(1)</td>
<td>-.638</td>
<td>.499</td>
<td>1.632</td>
<td>1</td>
<td>.201</td>
<td>.528</td>
<td>.199    1.406</td>
</tr>
<tr>
<td>WISDMWt</td>
<td>-.165</td>
<td>.137</td>
<td>1.455</td>
<td>1</td>
<td>.228</td>
<td>.848</td>
<td>.648    1.109</td>
</tr>
<tr>
<td>WISDMAffect</td>
<td>.043</td>
<td>.136</td>
<td>.101</td>
<td>1</td>
<td>.751</td>
<td>1.044</td>
<td>.799    1.364</td>
</tr>
<tr>
<td>Constant</td>
<td>-.328</td>
<td>1.404</td>
<td>.055</td>
<td>1</td>
<td>.815</td>
<td>.720</td>
<td></td>
</tr>
</tbody>
</table>

a. Variable(s) entered on step 1: Weight, QCSRFTotal, NEEDNTotal, HADSD, BDItotalDep, HxDepression, FamilyhxBinary, WISDMWt, WISDMAffect
Table 10.18: Logistic regression for mood and eating and LATE quit smoking outcome

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
<th>95% C.I.for EXP(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower</td>
</tr>
<tr>
<td>Weight</td>
<td>-.009</td>
<td>.013</td>
<td>.507</td>
<td>1</td>
<td>.476</td>
<td>.991</td>
<td>.965</td>
</tr>
<tr>
<td>QCSRFTotal</td>
<td>.010</td>
<td>.030</td>
<td>.111</td>
<td>1</td>
<td>.740</td>
<td>1.010</td>
<td>.952</td>
</tr>
<tr>
<td>NEEDNTotal</td>
<td>-.003</td>
<td>.006</td>
<td>.207</td>
<td>1</td>
<td>.649</td>
<td>.997</td>
<td>.986</td>
</tr>
<tr>
<td>HADSD</td>
<td>.118</td>
<td>.140</td>
<td>.710</td>
<td>1</td>
<td>.399</td>
<td>1.125</td>
<td>.856</td>
</tr>
<tr>
<td>BDItotalDep</td>
<td>-.076</td>
<td>.059</td>
<td>1.655</td>
<td>1</td>
<td>.198</td>
<td>.927</td>
<td>.825</td>
</tr>
<tr>
<td>HxDepression(1)</td>
<td>.715</td>
<td>.503</td>
<td>2.021</td>
<td>1</td>
<td>.155</td>
<td>2.044</td>
<td>.763</td>
</tr>
<tr>
<td>FamilyhxBinary(1)</td>
<td>-.400</td>
<td>.552</td>
<td>.526</td>
<td>1</td>
<td>.468</td>
<td>.670</td>
<td>.227</td>
</tr>
<tr>
<td>WISDMWt</td>
<td>-.028</td>
<td>.136</td>
<td>.042</td>
<td>1</td>
<td>.838</td>
<td>.973</td>
<td>.744</td>
</tr>
<tr>
<td>WISDMAffect</td>
<td>-.238</td>
<td>.153</td>
<td>2.398</td>
<td>1</td>
<td>.122</td>
<td>.789</td>
<td>.584</td>
</tr>
<tr>
<td>Constant</td>
<td>1.488</td>
<td>1.559</td>
<td>.910</td>
<td>1</td>
<td>.340</td>
<td>4.427</td>
<td></td>
</tr>
</tbody>
</table>

a. Variable(s) entered on step 1: Weight, QCSRFTotal, NEEDNTotal, HADSD, BDItotalDep, HxDepression, FamilyhxBinary, WISDMWt, WISDMAffect.

Analysis using forward conditional logistic regression with depression variable and each independent weight variable, and subsequent weight variable with each independent depression variable did not find independent predictors with each model (p > 0.05).

There appeared to be no predictors in both depression and weight variables which could reliably predict quit smoking status at EARLY and LATE follow-up for this population.

10.9.3 Summary

In summary, there was no association between mood and eating variables, and smoking cessation, found in this analysis.

10.10 Key Findings

Among the key findings reported were:

1. A total of 256 participants were recruited for the SCeMES-QN. The mean age was 46.2 years; there were slightly more females than males (54.7%); 91% of participants were Caucasian; 81% were employed; and 25.4% had completed secondary schooling.

2. The mean age of smoking initiation was 16.3 years and the average lifetime smoking duration was 30 years. The participants reported smoking an average
of 20 cigarettes a day and having attempted four quit attempts in their lifetime. The average FTND score was 6, QSU-brief 21.8 and WISDM-b 48.1.

3. Slightly over a third (35.7%) reported a history of previous depression. The mean score for HADSD was 1.8 and the BDI-II was 2.6. Using the agreed cut-off of >7 for the HADSD and 16 for the BDI-II, the prevalence for depression was 2.3% and 6.6%, respectively.

4. The mean weight was 79.9kgs and the average BMI 27.4. The average score for the QCSRF was 18.1 and for the NEEDNT 76. Only 0.8% of the participants were considered to fulfil the criteria for food addiction at baseline.

5. The retention rate at EARLY follow-up (M = 94 days) was 48.4% and LATE follow-up (M = 380) was 37.6%.

6. The only differences between those who attended any follow-up and those who attended only baseline follow-up apart from age (t = -4.60, p = 0.000), ethnicity ($X^2$ =4.04, df =1, p = 0.044) and employment ($X^2$ =4.04, df =1, p = 0.044).

7. Only demographic variables (age, duration of smoking, employment status and living with another smoker), not mood or eating variables, were found to be associated with EARLY follow-up.

8. Only age and lifetime smoking duration were found to be associated with LATE follow-ups. No association was found for mood and eating variables.

9. Age and living with another smoker predicted non-retention, while non-employment predicted retention among the EARLY follow-up. For LATE follow-up, gender and duration of lifetime smoking predicted non-retention, while cigarettes per day and non-employment predicted retention.

10. The quit rate at 3 months was 14.5% for EARLY follow-up and 14.8% at one year for LATE follow-up.

11. Using the HADSD and BDI-II instrument, depression detection was 3.2% and 6.5% at EARLY follow-up and 1% and 3.6% at LATE follow-up. No deterioration mood trend was found.
12. No association was found between mood variables and smoking cessation outcomes at both EARLY and LATE follow-ups. Logistic regression models for both EARLY and LATE mood variables found no predictors for smoking cessation outcomes at these two follow-up visits.

13. Overall, participants gained weight from baseline at both EARLY and LATE follow-ups by 1.3kg and 5.1kg respectively, and this was statistically significant (p<0.001). For participants who were both abstinent or not at follow-ups, the trend of weight gain found showed participants who were abstinent gained more weight at both three months and one year compared to those who were still smoking at the time of recording (p<0.01).

14. There was an improvement in overall scores for both craving for sweet and rich foods, and consumption of foods which were energy dense but nutritionally deficient. However, only the QCSRF score change from baseline to LATE follow-up was statistically significant (p<0.05).

15. No association was found between eating variables and smoking cessation outcome at both EARLY and LATE follow-ups. Logistic regression models for both EARLY and LATE eating variables found no predictors for smoking cessation outcomes at these two follow-up visits.

16. There was no increase in food addiction diagnosis using the mYFAS at three months and at one year.

17. There was no association between mood and eating variables, and smoking cessation, found in this analysis.
CHAPTER 11 - Qualitative Results (SCeMES-QL)

11.1 Chapter Overview

This chapter describes the results for the qualitative study of the SCeMES. A general introduction is provided on the overall data collected and the participants who participated in the qualitative arm of the SCeMES is reported. The qualitative findings are reported in a matrix together with relevant quotations. This chapter ends with a summation of the findings.

11.2 Introduction

The SCeMES-QL is the qualitative study in the SCeMES. It follows on from the SCeMES-QN reported earlier. In this sequential type MMR, the qualitative study is connected to the quantitative study. The SCeMES-QL was conducted using a semi-structured questionnaire which was developed from the experience of the SCeMES-QN. The use of this questionnaire allowed the interview to be more focussed in collecting specific information. This same interview aid, however, was flexible enough to allow newer issues or agendas to emerge during the course of the interviews.

Qualitative studies are often reported in the first person. However, to provide consistency with the remainder of the thesis, this chapter, similar to the previous chapters, will use the third person narrative or ‘voice’. The sole interviewer, who is also the main researcher, will be identified in the chapter as “the researcher”, while the interviewees will be identified as “the participants”. Where appropriate, participants will be identified as individuals to denote their “voice”; this allows them to share their quit smoking lived experience in the SCeMES. Where the individual participant is part of a focus group, this will be stated. Through this method of description, the researcher hopes to promote the “voice” of the participant and allow them to be ‘heard’.

11.3 Setting the Scene

A total of 25 participants agreed to be interviewed for the SCeMES-QL. Of the 25, 16 of them participated in the focus group interviews, while the remaining were interviewed individually. Three focus groups were formed for this study: FG1 (5 participants), FG2 (6 participants) and FG3 (5 participants). (Refer to Figure 11.1)
The participants were chosen purposively with the aim of providing a meaningful representation of participants’ perspectives of quitting smoking in the SCeMES. As described in chapter 9 all participants were interviewed at the National Addiction Center (NAC) by the researcher.

Results for the SCeMES-QL will be displayed using the matrix display method. The general induction approach method of labelling, describing and quoting relevant concepts or themes elucidated from the respective transcripts of all participants was used to share the findings for this study.

![Figure 11.1: Progression to Interviews]

### 11.4 Participant Characteristics

A total of 140 participants from the SCeMES were eligible to be interviewed. Those eligible for interview had completed baseline and one other visit for the SCeMES-QN, they were willing to be interviewed, they agreed to sign the consent form, and they were able to converse in English. Of these, only 94 were able to be contacted. Seventy-eight of the total 140 participants met criteria (attending two or more visits). Forty-eight participants agreed to be interviewed in focus-groups, but seven were not
able to be interviewed. Two of the seven declined, three were not in Christchurch to attend interviews, and the remaining two decided that they preferred to be interviewed individually. Of the remaining 41 participants who consented, five groups were initially planned. Two of these focus groups were cancelled due to poor participation (unable to meet a minimum of five participants) and the participants who attended were offered to be interviewed individually instead. Three focus groups were successfully completed.

Twenty-five participants initially agreed to participate in the three focus group interviews; however, only 16 participants attended on the day.

Nine participants were interviewed individually. Five were from the groups which were cancelled and four were chosen purposively for the study.

Of the 25 participants that were interviewed, the mean age was 51.4 years old (range 33-70, SD = 8.7), 13 (52%) were females, 22 (88%) were employed, and 9 (36%) had a school qualification. Fourteen (56%) had a history of lifetime depression and just over two-thirds, 18 (72%), gained weight in the SCeMES – an average of 4kgs (M = 4.2, range 0-11). The mean cigarettes per day (CPD) was 20.4 (range 10-30, SD = 6.7), and most had a high level of tobacco dependence score with mean FTND of 6.1 (range 3-9, SD = 1.8). The average number of years smoking was 35.2 years (range 18-54, SD = 8.6). Of the 25 participants interviewed, only one (4%) met criteria for food addiction diagnosis based on the mYFAS. Just over half, 13 (52%), were still smoking at the time the interviews were conducted.

On baseline demographic parameters, there was also little difference between those who participated in the qualitative study compared to the total population studied (Table 11.1). Smoking cessation, weight gain and food addiction outcomes were not included as they were analysed by either early or late which will be difficult to compare descriptively between groups.

11.5 Demographic Description Interview Type

There was little difference descriptively, in terms of age and smoking status (CPD, FTND and duration smoking), between those who were interviewed individually and those interviewed using focus groups. The one individual reported in the SCeMES-QN as having a diagnosis of food addiction, using the mYFAS, was purposively recruited for the SCeMES-QL. Purposive sampling allowed the collective numbers of
participants with issues of interest, namely weight and depression, to be represented in the SCeMES-QL. Refer to Table 11.1.

Table 11.1: Description of participants interviewed individually compared to those interviewed in FG

<table>
<thead>
<tr>
<th>Variable</th>
<th>Individual Interview</th>
<th>Focus Group</th>
<th>Total Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 9 N (%)</td>
<td>n = 16 N (%)</td>
<td>n = 256</td>
</tr>
<tr>
<td>Age³</td>
<td>52.0 (11)</td>
<td>51.1 (7.5)</td>
<td>46.2 (12.1)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Male</td>
<td>4.0 (44.4)</td>
<td>8.0 (50)</td>
<td>116 (45.3)</td>
</tr>
<tr>
<td>- Female</td>
<td>5.0 (55.6)</td>
<td>8.0 (50)</td>
<td>140 (54.7)</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Yes</td>
<td>8.0 (88.9)</td>
<td>14.0 (87.5)</td>
<td>208 (81.3)</td>
</tr>
<tr>
<td>- No</td>
<td>1.0 (11.1)</td>
<td>2.0 (12.5)</td>
<td>48 (18.7)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Tertiary</td>
<td>1.0 (11.1)</td>
<td>1.0 (6.3)</td>
<td>44 (17.2)</td>
</tr>
<tr>
<td>- Others</td>
<td>8.0 (88.9)</td>
<td>15.0 (93.7)</td>
<td>212 (82.8)</td>
</tr>
<tr>
<td>CPD³</td>
<td>19.6 (7.5)</td>
<td>20.9 (6.4)</td>
<td>19.9 (7.1)</td>
</tr>
<tr>
<td>FTND³</td>
<td>5.8 (1.8)</td>
<td>6.3 (1.9)</td>
<td>6 (1.8)</td>
</tr>
<tr>
<td># Years Smoking³</td>
<td>35.3 (10.3)</td>
<td>35.1 (6.8)</td>
<td>30 (11.9)</td>
</tr>
<tr>
<td>Quit Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Abstinent</td>
<td>5.0 (55.6)</td>
<td>7.0 (43.8)</td>
<td></td>
</tr>
<tr>
<td>- Still smoking</td>
<td>4.0 (44.4)</td>
<td>9.0 (56.2)</td>
<td></td>
</tr>
<tr>
<td>History of Depression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Yes</td>
<td>6.0 (66.7)</td>
<td>5.0 (31.3)</td>
<td>90 (35.2)</td>
</tr>
<tr>
<td>- No</td>
<td>3.0 (33.3)</td>
<td>11.0 (68.7)</td>
<td>166 (64.8)</td>
</tr>
<tr>
<td>Weight Gain</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Yes</td>
<td>6.0 (66.7)</td>
<td>12.0 (75)</td>
<td></td>
</tr>
<tr>
<td>- No</td>
<td>3.0 (33.3)</td>
<td>4.0 (25)</td>
<td></td>
</tr>
<tr>
<td>Amount Weight Gain³ (kg)</td>
<td>5.2 (4.6)</td>
<td>3.6 (2.8)</td>
<td></td>
</tr>
<tr>
<td>Food Addiction diagnosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Yes</td>
<td>1.0 (11.1)</td>
<td>0.0 (0)</td>
<td></td>
</tr>
<tr>
<td>- No</td>
<td>8.0 (88.9)</td>
<td>16.0 (100)</td>
<td></td>
</tr>
</tbody>
</table>

³ = Mean (SD)

11.6 Demographic Description of Focus Group

Focus groups were made up of participants who shared certain characteristics, to avoid the participants feeling uncomfortable about their smoking, mood and weight issues. By being comfortable, this encouraged the participants to have meaningful
discussions during the interviews. Participants grouped in focus group 1 (FG1) \((n = 5)\) were all smoking and had no history of depression. FG1 participants did not complete all of SCeMES whereby they attended either an EARLY or LATE follow-up. Focus group 2 (FG2) \((n = 6)\) participants consisted of those who were abstinent from smoking and had no history of depression. This session was unexpectedly attended by only the male invitees. This group also comprised participants who had completed the full SCeMES. Focus group 3 (FG3) \((n = 5)\) was a group of participants who were still smoking at the time of the interview and had a history of lifetime depression.

FG1 was predominantly female, with participants who were employed, had minimal tertiary education, smoked 20 cigarettes per day, and smoked on average for 31.8 years. All were still smoking at the time of interview and none had a history of lifetime depression. Just over half gained weight, the average weight gain being 2.2kg.

FG2 was a men’s only group with participants who were all abstinent from smoking. This group also consisted of an older population with a mean age of 54.8 years, the majority being employed, and none having had tertiary level education. Among the three groups, those in this group smoked the most on average, at 21.7 cigarettes per day, and had a longer mean history of smoking – 40.7 years. There was no one with a history of lifetime depression in this group, but all participants reported weight gain and the average weight gain being 6kgs.

The final group, FG3, consisted of participants who all had a history of lifetime depression and all of them were still smoking at the time of interview. This group was the youngest group with an average age of 46.2 years. The majority were female, employed, but with no history of tertiary level education. Participants in the focus group smoked on average 21 cigarettes per day and smoked for 31.8 years on average. Just over half of them reported weight gain during the study; the average weight gained was 2kgs.

All participants in the focus groups had similar levels of nicotine dependence and no one was diagnosed with food addiction during the study.

### 11.7 Demographic Description Based on Quit Smoking Outcomes

Table 11.2 highlights the differences and similarities between participants who were abstinent and those who were still smoking at the time of interview. There were almost equal numbers of abstainers and smokers amongst those interviewed. The
participants who were abstinent were seen to be older; they had fewer cigarettes per day but higher FTND, and longer lifetime smoking. In keeping with SCeMES-QN findings, those who reported being abstinent also reported more weight gain.

Table 11.2: Abstainers compared to smokers in SCeMES-QL

<table>
<thead>
<tr>
<th>Variable</th>
<th>Abstinent n = 12</th>
<th>Smoking n = 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agea</td>
<td>54 (8.7)</td>
<td>49 (8.2)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Male</td>
<td>8 (66.7)</td>
<td>4 (30.8)</td>
</tr>
<tr>
<td>- Female</td>
<td>4 (33.3)</td>
<td>9 (69.2)</td>
</tr>
<tr>
<td>Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Yes</td>
<td>10 (80.0)</td>
<td>12 (91.7)</td>
</tr>
<tr>
<td>- No</td>
<td>2 (20.0)</td>
<td>1 (8.3)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Tertiary</td>
<td>1 (9.1)</td>
<td>1 (8.3)</td>
</tr>
<tr>
<td>- Others</td>
<td>11 (90.9)</td>
<td>12 (91.7)</td>
</tr>
<tr>
<td>CPDa</td>
<td>19.3 (7.2)</td>
<td>21.6 (6.3)</td>
</tr>
<tr>
<td>FTNDa</td>
<td>6.3 (1.5)</td>
<td>5.9 (2.1)</td>
</tr>
<tr>
<td># Years Smokinga</td>
<td>39 (9.3)</td>
<td>31.7 (6.3)</td>
</tr>
<tr>
<td>History of Depression</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Yes</td>
<td>4 (33.3)</td>
<td>7 (53.8)</td>
</tr>
<tr>
<td>- No</td>
<td>8 (66.7)</td>
<td>6 (46.2)</td>
</tr>
<tr>
<td>Weight Gain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Yes</td>
<td>11 (90.9)</td>
<td>7 (53.8)</td>
</tr>
<tr>
<td>- No</td>
<td>1 (9.1)</td>
<td>6 (46.2)</td>
</tr>
<tr>
<td>Amount Weight Gaina (kg)</td>
<td>5.9 (3.1)</td>
<td>2.5 (3.2)</td>
</tr>
<tr>
<td>Food Addiction diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Yes</td>
<td>1 (9.1)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>- No</td>
<td>11 (90.9)</td>
<td>13 (100)</td>
</tr>
</tbody>
</table>

a = N (Mean)

In summary, Tables 11.1 and 11.2 and the description of participants in all three focus groups were representative of those in the larger SCeMES. Differences that were present indicated the purposive nature of the sampling technique for the SCeMES-QL.

11.8 SCeMES-QL Interview Findings

Three domains, consisting of five major themes, emerged during data analysis to express a participant’s experience in quitting smoking in the SCeMES.
The participants in the SCeMES-QL (both focus groups and individual interviews) described the SCeMES as being more of a ‘journey to quitting’ rather than being outcome orientated i.e. being abstinent or not. This was very much different from how the researcher thought of quit smoking experiences. Nevertheless, the participants continued to aim to achieve abstinence from smoking at some point in their life.

So it’s a constant thing, it’s not... like I admire the people who just make a clear cut decision and they don’t have an addictive gene and so for them it’s the end of the journey, it’s over. But for those of us who’ve struggled, it’s like... I don’t know for the rest of you, but...it’s like when you get to the end of the first three weeks you wanna stand on a rooftop. In fact, you can stand on a roof top and say, “Look at me.” Because you’re so proud of yourself within yourself... cause you know what a battle it’s been, that you want everybody to know that you’re very clever just now. Of course you’re not gonna tell them a month later when you’ve fallen off again (laughter). (FG1, female, 65)

11.8.1 Journey towards Smoking Cessation

The first domain was the experience of smoking cessation itself. This was conceptualised by three major themes which were labelled as:

a. The outlook of quitting

b. The process of quitting and

c. Support.

The themes were subsequently expanded to categories and subcategories which were supported by relevant codes to illustrate the iterative development of each theme. Each code, or cluster of codes, was further supported by explanations or quotes to provide context and meaning to the theme. A matrix table is also included at the end of each domain presentation.

a. The Outlook to Quitting

The first of three themes under ‘journey towards smoking cessation’ is the ‘outlook to quitting’. This theme attempts to describe the participant’s expectations of trying to quit smoking. There were two categories found from the interview which attempted to explain this theme. They were labelled as ‘matched expectations’ and ‘mismatched expectations’ (Table 11.3).
11.8.2 Matched Expectations

The category ‘matched expectations’ was associated with a positive experience or it matched the participant’s expectations to quit smoking. For the matched expectation category, four subcategories were reported: readiness, information, accountability, and identity. Participants who reported a positive experience in quitting smoking were found to describe a sense of ‘readiness’ in their experience. Another way to describe this was being prepared mainly for the quit smoking journey. Participants who reported this subcategory also reported feeling determined about their chances in getting rid of their smoking. The quotation below from one participant, who was abstinent at the time of the interview, illustrates what readiness to quit meant to her.

So I think my mind was made up pretty strongly that I was giving up, and it didn’t matter what was thrown in my direction, I was giving up, and that’s all there was to it. (Individual5, female, 56)

The participants categorised as having ‘matched expectations’ were also described in this subcategory of ‘readiness’ as having the ability to cope well with any given situation during the course of their journey to quit smoking. This ability was either learnt from a previous quit attempt or was the result of the current quit attempt. Often, these participants were aware of their surroundings and therefore able to adjust accordingly. This inevitably influenced their ‘outlook to quitting’ as a result.

The participants who reported having ‘matched expectations’ also reported acquiring a deep sense of what was expected of them during the smoking cessation program. They reported a clear understanding of the treatments that were available and were clear with the instructions on how to use the available or given treatments. This ‘matched expectation’ in terms of ‘information’ was often accompanied with a more positive experience in quitting.

Another subcategory of the ‘outlook to quitting’ was ‘accountability’. Accountability was reported to be for both the participant who was attempting to quit smoking, and to other people who were supporting their quit attempt. These other people usually included family, friends or the treating healthcare provider. The sense of accountability allowed the participants to feel in charge of their own health, which allowed them to be more accepting of their outcomes.

No, I’d been thinking about it and I’d seen it advertised, I forget where I’d seen it now, but as soon as I committed myself to become part of it I knew then that I
was on the way to giving up. But as (sic) it didn’t work out for me, the way I thought it would, but I carried on because you made me think about it more. (Individual3, male, 58)

For some participants, being accountable to another person, such as their own therapist, motivated them to continue their quit smoking journey.

I think it’s cemented…. Hmmm, it’s cemented the idea in my head that hey look, you can quit. Because people like yourself [their therapist] wouldn’t be constantly doing these things if it wasn’t actually achievable. If something is not achievable, then hey you just don’t go there, do ya? It’s obviously achievable. (Individual7, male, 33,)

The final subcategory reported was ‘identity’. This subcategory was related to how the participants viewed themselves and their ability to adapt to change. The participants who reported a more positive experience in their quit attempt were often more flexible in their approach to quitting, and eager to learn skills to be successful in quitting either through their own self-reflections or from the SCeMES. Below is a description of an individual who had managed to quit smoking at the time of the interview.

I took it a day at a time for a start. And then I went to a week at a time and then I got a couple of weeks and I’d say to my wife, you know, ‘Two weeks I haven’t had a cigarette.’ And I was so proud of myself because I’ve always been a smoker. I mean I’m nearly 60 years of age, I’ve smoked for 45 years I would say and I just… it was just… it’s easier to smoke than to give up. It’s a lot easier to carry on smoking, pay the money [to buy cigarettes] and carry on because it’s hard work to give up, very hard. And I think I’m so proud of myself that I’ve made it and I won’t go back again, touch wood. (Individual3, male, 58)

11.8.3 Mismatched Expectations

The category of ‘mismatched expectations’, the opposite of ‘matched expectations’ was related to a more negative quit smoking experience. Participants in this category reflected a mismatch of what was expected from them to quit smoking and what they thought they needed to do. The subcategories were similar to ‘matched expectations, namely readiness, information, accountability and support. However, the experience was more often negative.

Those who reported negative experiences were often not ready to quit smoking. They were ill-prepared for the quit attempt and related that their main motivation for quitting was to please other people and not themselves. These same participants
also appeared to express ambivalence and indifference towards their quit attempt as described below. The participant identified as Individual1, was still smoking at the time of the interview.

Um... Again, it's the sort of concentration, the sort of determination to stick through it and go to the grouting and break all the habits that you normally do things anyway. Which I've done, putting off easier for the zonnic and the [something]. (Individual1, female, 49)

Participants categorised as having ‘mismatched expectations’ reported being overwhelmed with any level of stressors. These stressors were either described as internal, such as anxiety feelings, or external, such as work pressures or events surrounding them. These participants also reported a lack of prioritization to quit smoking, although they were involved in a quit attempt at the time. As a result, the participants in this category were likely to relapse at the slightest pressure. This can be demonstrated in two participants who were still smoking below.

I think it became an excuse for me, anything over about a four [relating to earthquake aftershocks], I thought, 'I need to...' I think it did, it became a bit of a game I think. It was like just an excuse. You had to get and have one. (FG1, female, 51)

You know, I was... Yeah. So, yes a little bit... cos there was too much to cope with –I was having a new job, um, and all that sort of stuff, so it was just too much, too hard to quit really. That's why I've said to you I've got it all under control and things are more settled. (Individual1,female, 49)

The participants with a mismatch in their expectations to quit smoking were also often less informed on their quit smoking interventions. This lack of understanding of their treatments resulted in a more negative quit smoking experience. For example, the participant might have expected the new quit smoking treatment, Zonic™, to work immediately, a “snap fix” as one participant described, which unfortunately might not be the case. As a consequence of these mismatched expectations, participants in this category also related a sense of frustration when using the available quit smoking treatments provided to them.

Participants who reported a more negative experience also appeared to be more inflexible in their responses during the interviews. They were less enthused about what was offered to them, and they appeared to be more rigid in their thinking regarding the reasons for their smoking and the quit smoking treatment provided.
They were also least likely to report gaining any new experiences during the SCeMES to assist in their quit smoking attempt.

Well, it would be nice to be a non-smoker. After 30 years, it's part of who you are and whatever, but we all know it's really bad for you. So it would be nice to be a non-smoker but the reality of it, that’s the ideal to be giving up, but the reality is far, far, far from it. (Individual1, female, 49)

In terms of accountability, they were often less committed to themselves or to what was required to assist with their quit attempt. Those with ‘mismatched expectations’ reported less commitment to themselves or to a significant other to quit smoking. This resulted in earlier episodes of lapse in each quit attempt.

Cold turkey, oh twice, that was when I was pregnant. And funnily enough I found that really easy, as soon as the doctor said, ‘You’re pregnant,’ that was it. And back when I had my kids, it probably wasn’t high pressure to give up, it was probably more of a suggestion. But then it wasn’t for me either. I was giving up for somebody else, so whether that made it easy. Or the time I gave up just cold turkey, and lasted probably about six-seven months, but my marriage split up then. (Individual5, female, 56)

In summary, it appeared that the participants’ quit smoking experience was related to their ‘outlook to quitting’. This outlook comprised two categories which were the opposite of each other and termed as ‘matched’ or ‘mismatched expectations’. Both expectations were further explained by similar subcategories: readiness, information, accountability and identity. However, the content or codes for each differed. See Table 11.3.
Table 11.3: Matrix display for the theme ‘The Outlook to Quitting’

<table>
<thead>
<tr>
<th>Categories</th>
<th>Subcategories</th>
<th>Codes</th>
<th>Explanation for category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matched Expectation</td>
<td>Readiness</td>
<td>Preparedness</td>
<td>Related to the preparation (psychologically) in relation to quitting smoking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hope</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Determination</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coping</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insightful awareness</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information</td>
<td>Understood information</td>
<td>Related to the information and understanding of what was required to quit smoking in terms of the smoking cessation program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clear instructions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clear expectations of limits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
<td>Self</td>
<td>Related to the responsibility to self or another person during smoking cessation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identity</td>
<td>Flexible</td>
<td>Related to individual uniqueness of the participant which may affect their outlook to quitting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Willing to learn</td>
<td></td>
</tr>
<tr>
<td>Mismatched Expectation</td>
<td>Readiness</td>
<td>Not ready</td>
<td>Related to the preparation (psychologically) in relation to quitting smoking</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ambivalent</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overwhelmed</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Priorities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Information</td>
<td>Quick fix</td>
<td>Related to the information and understanding of what was required to quit smoking in terms of the smoking cessation program</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unclear instructions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor understanding information</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Accountability</td>
<td>Self</td>
<td>Related to the responsibility to self or another person during smoking cessation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Others</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Identity</td>
<td>Inflexible</td>
<td>Related to individual uniqueness of the participant which may affect their outlook to quitting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Set in own ways</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Poor self-esteem</td>
<td></td>
</tr>
</tbody>
</table>
b. The Process of Quitting

Another major theme which emerged from the SCeMES-QL and conceptualised the meaning of smoking cessation for the participants was the ‘process of quitting’. This theme reported procedures experienced by the participants which they described as their quit smoking experience. Two major categories which emerged from the data to further expand on this theme were labelled as ‘the particularities of quitting smoking; and ‘the undesired spin-offs of quitting smoking’.

11.8.4 The Particularities of Quitting Smoking

The ‘particularities of quitting smoking' was one of the two categories which emerged in the understanding of the 'process of quitting'. This category included the steps and procedures to quit smoking, from the moment the participants entered the program up till the end of the program.

This category was illustrated by four subcategories which were labelled as provider, treatment, follow-up and outcome (Table 11.4). Each subcategory will be dealt with individually below to allow a better understanding of the category and how it affected the experience of quitting smoking for the participants.

11.8.4.1 Provider

The participants described five major quit smoking providers during their quit attempt in the SCeMES. These providers shaped their experience of a quit smoking program (both directly and indirectly). Of the five, general practitioners and the Quitline service were mentioned the most often, followed by nurses, hospital physicians and finally dentists. Irrespective of who was providing treatment, the participants who reported a more positive experience in their current journey to smoking cessation, related dealing with providers who had traits of being respectful, non-judgmental and supportive.

Oh, I took it [quit smoking brochure] because even at that time, well it was last year, it was... I’d already decided that this year I was going to give up smoking. So I was quite happy to take it. But I hadn’t made my mind up what I was going to do about it. Yeah, so yeah. No, I was quite pleased to get it, so yeah. (Individual6, female, 46)

One hell of a thing because, then they got me antibiotics and what have you, and without the smoking... well, funny enough, I thought... well the Dentist said to me; he says, ‘You shouldn’t be smoking, you know, not with that.’ He says, ‘That's gonna infect it,’ and it did [and] it made it worse. But, he says, ‘Anyway,’
he says, ‘Put another ten years on your life if you stopped.’ Bit of a laughing matter. I thought, ‘He’s probably bloody right!’ (FG2, male, 67, 10 quit attempts)

The participants who reported a negative experience in their quit attempt related the opposite sentiment. The providers they encountered had made them felt unwanted, belittled and the feeling of not being trusted during the consultation.

Absolutely none and almost a negative thing is like, you go back to your GP after a lengthy period of time on whatever, and we haven't given up and it's almost a sarcastic, 'Oh, I didn't think you would,' but that's getting a little bit sort of... under my GP, yeah, oh yeah I knew you wouldn't. (FG2, male, 56, 3 quit attempts)

Well, I could see that he wasn't prepared to waste the time with somebody who was going to smoke every day, drink themselves just about silly every night and then expect to be treated. I mean, it doesn't make sense. You know, why treat people if they're just going to continue to abuse their bodies (sic) with smoke or alcohol. (Individual8, male, 70, 6 quit attempts)

The participants in the study reported a strong preference for face-to-face consultations. This was the type of consultation experienced most during visits to general practitioners, with nurses, hospital physicians and even the dentists. The experience with Quitline, which was through the telephone, was by contrast described by most of the participants interviewed as easier to disengage from.

Yeah, I had a phone call or emails from Quitline, they're easy to ignore and just palm them off, whereas if you're coming to see somebody......it's hmmm I don't know... like there's empathy attached to it as well, which helps. (FG1, female, 41, 2 quit attempts)

The Quitline as an option for quitting smoking was recognised by all the participants interviewed. A number of the participants had used the Quitline service in the past. Although these participants related to understanding the general aim of the Quitline service, they were not fond of it. The main issue reported by these participants was a lack of warmth compared to the face-to-face consultations. Often the complaints were reported as a lack of empathy due to the nature of the intervention which was stated matter of fact by one participant as, “you were talking to a telephone”.

Yeah, I think it would help a lot of people, I do. I think it would make a big difference to some people. (Individual5, female, 56, 4 quit attempts)

Yeah, I mean there’s definitely support. With those things, like the Quitline, they’ll call you up, or you can call them. There’s different sorts of things you can get and things like that as well. (Individual7, male, 33, 7 quit attempts)
11.8.4.2 Treatment

The second subcategory which emerged during the discussion with participants was labelled ‘treatment’. This subcategory was associated with mainly the information provided on the quit smoking treatments used during the SCeMES. The information on treatment was related to the instructions for using the treatment, the explanation of the side-effects, and also the understanding of the limitations of the treatment. More often than not, a negative experience in smoking cessation was the result of unclear information and instructions on the treatment provided. A number of participants recounted that the difference between their current quit attempt and a previous attempt was associated with the clarity of the treatment information provided. A clear understanding of what was expected appeared to lead to a better experience.

So yeah, it was actually your advice that really... just even on how to use the patches, it made a big difference. The other options were the GP would give you a box or you’d go to a chemist and they'd give you a box and you’re like, 'Mate, you'll be fine. Away you go...'. (FG2, male, 44)

Well, obviously there were.. hmm....certainly having the patches, the understanding of the patches using seven days before can effect it was a big thing that I learnt. It did help once you explained about the build up [of the medication dose], that was very helpful, so I didn't have the expectation from day one it working. I felt that when it did kick in later, that was a big help. Normally when you get the patches, they don’t tell you that. You kind of stick one on and be expecting that it be working straight away. (Individual1, female, 48)

Clear information on treatments used to assist in quitting smoking was as important as the understanding of the possible side-effects, and what was able to be anticipated by the given treatments. The participants who related to being provided with clear information on their treatment often related a more positive experience and were more likely to think fondly of their quit attempt.

I quite liked using the patches, and even the mouth spray, even though I didn’t use it all that often. At the start, I think the first six weeks, it was really quite good. I know it sounds really silly, but the patches, I always remember Jeela saying right at the start that it could cause vivid dreams, and I had some really vivid dreams. (Individual6, female, 46)

Both a lack of information, and therefore limited understanding of the treatments, were more likely to lead to a more negative experience in quitting. One example of a lack of information was expecting the treatment to work in an unexpected fashion, in
the words of the patient, ‘a snap fix’. This lack of information leads to mismatched expectations (Table 11.3) highlighted earlier.

Another code to describe the subcategory ‘treatment’ was options. If the participants were presented with options during their quit smoking management they were more likely to report a more positive quit attempt. Being provided with treatment options meant having some level of control (autonomy) in the participants’ management, which they saw as a positive experience; participants who reported the opposite had a more negative quit smoking experience.

Not really. Having the options….Zonnic™ helped to give...for me it works because I had the patches on as well and having one or the other I’m not sure if it will work. (Individual1, female, 48)

11.8.4.3 Follow-up

‘Follow-up’ was the third subcategory for the category of ‘particularities of quitting smoking’. The following-up of smokers in a smoking cessation program was part of the greater management of these participants. Follow-up care can be further represented either by the type of follow-up received – face-to-face, correspondence or by phone; or by the frequency of follow-up.

During the interviews, the participants reported preferring personal follow-ups such as face-to-face, compared to impersonal follow-ups such as the Quitline calls.

And I found that coming and having the meetings and doing the tests here was a big boost to ringing the Quitline; getting seen, the prescription and this last year did pretty much. (FG1, male, 52)

Emerging from the data in exploring follow-up preferences was the suggestion of group based therapy as one alternative form of treatment. Compared to Alcoholics Anonymous for example, two participants felt that smoking cessation was neglected somewhat, as there was no group therapy provided. Group therapy, to these participants, allowed more interaction amongst those attempting to quit. The participants related that being part of a group of people, all of whom were involved with the same trials and tribulations of trying to quit smoking, provided some level of support between them.

I could be wrong, but in my knowledge, there’s no weekly group meeting thing for quitting cigarettes. You know, it’s there for drugs and alcohol. Even though cigarettes are classed as a drug now, right. But as far as I know, there’s no CC
Anonymous, or CS Anonymous, you know Cigarette Smokers Anonymous; and I really do believe that because, it’s a smaller amount of people compared to how many… I mean this is my own belief; but I think the bulk of people can eventually work that out. (Individual7, male, 33)

A second important code which represented the subcategory for follow-up was the frequency of visits. Frequency of visits was proportionate to the time to attend treatment and the duration of the follow-up visit. The ideal duration and number of visits was not determined; however, those who felt that the duration and frequency of visits were adequate coped better and had a more positive quit smoking experience. Those participants who felt that their visits were short or not as frequent as they expected reported a more negative quit smoking experience. To further illustrate the schism of this code, one participant summed it nicely by stating that everyone is different and what works for one person may not work for another.

And I think that some of those things have to be taken in when you’re doing something like that and if somebody needs... I need constant checks on everything I do, I need people and you’re still doing that, you know. Where other people need to be probably left alone, but given a longer; you know, like if you were told, ‘Okay, you’re not ready, so how about we extend that out to more weeks?’ (FG3, female, 49)

11.8.4.4 Outcome

The final subcategory identified was the desired outcome of the program itself. All participants wanted to quit according to one participant. However, from the interviews, it was clear that some were satisfied to have reduced the number of cigarettes smoked per day instead of abstinence; this was often the main aim and outcome of any quit smoking program or study. For some participants, a reduction to a lower number of cigarettes compared to their initial baseline smoking was regarded as a successful outcome.

I mean... I still think, um... I’m not smoking as much as before I started the study. Even now I’m not smoking as much as I was. It’s up... It’s gone up again. Probably just over 20, but it's not back over 30. (Individual6, female, 46)

For others, reduction was not an option as it was not abstinent and therefore indicated failure. This inability to accomplish the expected outcome led to a sense of guilt and a more negative experience in their quit smoking attempt.

But I just think more of the fact of, like if it was a study... what was it, was it once a month, or it started off monthly and then it went into spreading that apart. And I
did actually notice that I seem to get back into smoking when I wasn’t coming in here as frequently. Because I’ve definitely, I’m still nowhere near smoking what I used to smoke. But the fact is I’m still having a bloody cigarette, and that’s still as bad as anything. (Individual7, male, 33)

11.8.5 The Undesired Spin-offs of quitting smoking

The next category in the ‘process of quitting smoking,’ was categorised as the ‘undesired spin-offs’. The concerns within this category were from the participants’ responses to dealing with, or managing, the consequences of quitting smoking whereby the majority voiced their experiences with unwanted consequences.

Two main subcategories were reported by the participants when this issue was explored. The two subcategories best to explain the experience of the participants were labelled as ‘mood changes’ and ‘weight concerns’ (Table 11.4).

11.8.5.1 Mood Changes

The SCeMES was interested in the relationship between smoking cessation and mood, in particular, depression. As a result, the researcher, over the course of the interviews, emphasised depression as a consequence of quitting using the semi-structured interview script developed. The interviews, however, did not suggest that depression exerted any major impact during the SCeMES quit smoking attempt. Depression was found to be a feature of withdrawal and an unpleasant experience for some participants, but not a major concern by the majority of those interviewed.

The participants with a previous history of depression did not relate that their mood was anything like how they felt when they were suffering from clinical depression in the past. The interviews did find, however, that the participants related experiencing depressed mood instead of clinical depression. Below are some examples from the participants who have had clinical depression in the past.

No… If I… if I happened to be depressed, giving up smoking, then it would’ve been a lost one… (Individual1, female, 48)

Oh, I guess emotionally, because I think; and the previous times, I mean I can recall easily sort of being quite..... having suicidal thoughts. Nothing like that this time. Even went to brief counselling, ‘cause one episode was while I was at University, so I withdrew from studies, but I did go and have some counselling. But nothing like that this time. (Individual6, female, 46)

That’s why I mentioned earlier that I don’t think it was me not quitting, or me quitting smoking, or going onto... I don’t think it was the fact I was trying to quit smoking that contributed to me getting depression, but I think if I really did think about it, I think it might have contributed a wee bit in the way, like I was saying
before, there was all those triggers when you have a cigarette, why you want to a cigarette. (Individual7, male, 33)

Participants with a history of clinical depression found it difficult to continue quitting smoking in case their depression reappeared. One participant put it simply:-

Smoking was the last (sic) of my problems at that time. (Individual6, female, 46)

Other participants also supported this statement by saying that there would be almost no consideration to even consider a quit attempt when they had clinical depression.

So... then I’ve got depression under control and I’m functioning –and I’m functioning well – mean I can cope with not smoking. But if I’m in a dark place and I’m not even coping with sort of getting out of bed in the morning and, you know, communicating and all I want to do is, sort of, wither away and die...well I don’t want to (nervous laugh) I don’t want to have to be thinking about smoking at the same. It would just be too much of a pressure. That’s my opinion (clears throat). (Individual1, female, 48)

I mean I look at things totally differently now that I haven’t got depression and so I don’t need that crutch. (Individual8, male, 70)

Although the focus was on depression, the participants also related other mood changes which were experienced during the whole smoking cessation process. One of the reported mood changes was anxiety which was described in many forms such as feeling irritable, feeling anxious, feeling stressed and also feeling fearful.

Grumpy, bad tempered; lose the plot so easily. Yeah, stupid little things would set you off. I'm damned if I know why but just the dumbest of things when you look back on it, would set you off and away you'd go. (FG2, male, 56)

Hugely for me because when I feel my anxiety and my stress building; cigarette, cigarette, cigarette and as soon as I have it, it drops. (FG3, female, 45)

I'm losing my cool or getting angry about things that wouldn't normally anger me. (FG3, female, 41)

For some participants, the mood change experienced was a feeling of grief. This emotion was probably in response to discontinuing their cigarette use. Further analysis suggested that this feeling of grief was in relation to the participant’s perception that this quit attempt was to be their last. As a result, this was the finale in using cigarettes. On further exploration, it was unclear if the participants considered withdrawal symptoms as a reason for these mood changes.
And I think… that just was a head thing; that was just a psychological perhaps partly avoidant thing. I don’t know. But yeah, now I don’t get that kind of, you know, sort of feeling of, you know, my best friend’s died. (Individual4, female, 46)

Yeah, I think even with this time, I think I did go through a small wee patch where, it sounds stupid, it’s almost like you’ve lost a friend, yeah. And it’s not when I first gave up, it’s sort of after a wee bit that yeah, you suddenly think, ooh you know, that security thing that you reach for when things weren’t right, or whatever, it’s not there anymore. Yeah. (Individual5, female, 56)

One unexpected response was the reporting of elevated mood compared to depression or depressive mood. Further clarification regarding this experience found that the elevated mood was in response to the participant’s ability to become abstinent or reduce their cigarette use. It was not in response to any known physiological consequences of nicotine withdrawal.

I think I feel better not smoking, because I have a bit of control in my life, so I think I felt more elevated, yeah. (FG1, female, 48)

11.8.5.2 Weight Concern

Another focus of the SCeMES-QN was the role of weight in smoking cessation. The data suggested that the participants were concerned with their weight prior, during, and after the smoking cessation program. In general, unlike depression, weight gain was a greater concern. Only a small minority reported no weight gain during the course of smoking cessation, whereas the majority gained weight.

Weight concerns were a major reason for not wanting to quit smoking for a few participants, a reason to consider stopping their quit attempt midway for others, and a reason to totally relapse back to smoking for yet others. More importantly, these concerns were mainly related to gaining weight.

So I don’t know why, I have no idea why, ‘cause that was my fear, that I was just gonna keep putting it on. So I don’t know the answer to that. I mean I'm sitting here now and I'm really thinking, ‘I’d really love a cigarette’ and it’s been a month, you know three weeks since I’ve had one. (FG1, female, 51)

Yeah, and so I did, I put on three kg very quickly, very quick and it’s very distressing. It was, I hated it and I, then my mind starts saying, ‘Oh my God, I'd rather be a smoker than fat’. (FG3, female, 41)

Yes. I keep on thinking to myself that I should start again. I might lose all this weight, but I don't want to do that. I don't want to start again because there is a price anyhow. The price of smokes puts me off. (Individual2, female, 48)
When the participants were asked about reasons for their weight gain, the majority of the participants reported that it was mainly the result of increasing food intake. There was little emphasis on what types of foods were involved in this weight gain. The data appeared to suggest that the participants understood weight gain was the result of increasing consumption of any type of food during their quit smoking attempt in the SCeMES. When the researcher probed further on this experience, the participants reported enjoying food more after quitting smoking due to the return of the senses of taste and smell, and an increased appetite to eat.

And if anything, in those months, especially the recent months when I have been... I've actually found my diet improved dramatically 'cause I could taste food. (FG1, female, 65)

...and it was a real hard effort not to have two helpings of that. (FG2, male, 56)

...but the flavours of some foods; what did kumara or yams taste like before, I have no damn idea. Now, wow. (FG2, male, 56)

Hmmm....yes and no. sometimes but sometimes not. Yes, probably are, I was eating proper foods now but whereas before I was eating junk foods. I could eat a big huge, king size,...bigger than a king size cake of chocolate before... (Individual2, female, 48)

During the interviews there was little mention of craving which is defined as an intense desire for a certain item. For this study, the item of interest was the craving for food in general, or for a particular food item, such as sugar.

Although the participants appeared to be more aware of sweet foods when weight was discussed, there was not much else which suggested the participants who did gain weight were craving for sweet foods.

I think what changed for me was everything. I found I was eating more which put my weight on, not so much snacking. I was actually really conscious of my chocolate bars and things like that, you know. I thought, 'No, no, I don't want to go there.' I don't want to, you know, replace it... but the quantity of food I was eating, increased and that's why I think my weights gone [up] so that's what I'm trying to reverse now. It's down to the quantity again but yes, you're right, the taste of food is just incredible [which was not there before]. (FG2, male, 44)

The participants did not report increasing their energy output by increasing activity levels or exercising, despite their awareness of the impact this may have on their weight gain in the SCeMES. Some participants had made great efforts to incorporate this transformation (quitting smoking and eating healthy). However, the majority of
participants interviewed had concentrated on quitting smoking solely. One respondent explained this inaction to be because “quitting smoking required a lot of concentration”; this revealed the possibility that participants needed to concentrate on one lifestyle change at a time.

The researcher’s interest in substitution of food being a reason for weight gain was not reported by the majority of the participants. The one individual with a diagnosis of food addiction related that there was a clear relationship between the two; others felt that this connection was plausible. However, the majority disagreed with this hypothesis. The participants reported that if there was a substitution phenomenon happening, it was in response to stress, as in ‘comfort eating’, rather than a direct switching from nicotine to food.

I think I’m using food as an excuse to… I don’t know. I mean eating, I love food, it’s a pleasurable thing. But there are so many sort of, I don’t know, I suppose negative things, like my broken house, and then there’s, I’m so busy at work that I never have any time, so it’s just easier to get take-out, and I don’t know. Eating has that sort of immediate effect of, oh it feels really good. But then as soon as you stop, as soon as I stop, I think, whoa I’ve eaten too much, and of course the feeling goes away. It’s almost like a compulsion, and an addiction in itself. (Individual6, female, 46, met criteria for food addiction)

Yeah, well just lollies or something like that, just as a comforter. (Individual9, male, 63)

An emerging issue of importance, in relation to weight concerns, were reports that the participants were using the questionnaires for assessing food intake, craving and addiction as a form of treatment. Some participants reported becoming more aware of their eating habits as a result of the questionnaires used. This was similar to the use of the smoke analyser, another assessment tool, which had also inadvertently become a treatment tool by the participants of the study. Some participants reported a change in behaviour as a result.

I’ve been particularly careful, knowing that when you stop you’re inclined to eat more. And it was good that that set of questions about …hmmm…for example, “Do you avoid going somewhere where there’s going to be for example pavlovas because you can’t stop eating pavlova?” you know that sort of thing. And so I’m very particular about my weight. I mean I know I’m about 80 to 82kg. (Individual8, male, 70)

Your eating habits, which was quite comprehensive, although before I’d gone on this programme I have been over a long period of time, looking at my eating habits. And with quitting I haven’t put on any weight, if anything I’ve got down to my target weight. So yeah it’s … it has made me stop and think and look at going
through the questionnaires what I actually am eating. So yeah I have made a big change (Individual9, male, 63)
Table 11.4: Matrix display for the theme Process of Quitting

<table>
<thead>
<tr>
<th>Categories</th>
<th>Subcategories</th>
<th>Codes</th>
<th>Explanation for category</th>
</tr>
</thead>
<tbody>
<tr>
<td>The particularities of quitting smoking</td>
<td>Providers</td>
<td>GP, Hospital based medical</td>
<td>Identifying the providers of management</td>
</tr>
<tr>
<td></td>
<td>Dentists</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nurses</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quitline</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Treatment</td>
<td>Information, Options</td>
<td>Describing the treatment provided during smoking cessation</td>
</tr>
<tr>
<td></td>
<td>Frequency</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type of follow-up</td>
<td></td>
<td>Describing the follow-up period of smoking cessation</td>
</tr>
<tr>
<td></td>
<td>Outcome</td>
<td>Abstinent, Smoking</td>
<td>Describing the end goal expected by participants when participating in smoking cessation</td>
</tr>
<tr>
<td></td>
<td>Mood changes</td>
<td>Emotional responses</td>
<td>Mood changes during smoking cessation which included feeling depressed, anxious, or feelings of grief or elevation</td>
</tr>
<tr>
<td>Weight concerns</td>
<td></td>
<td>Weight gain, No gain</td>
<td>The experience of gaining weight after quitting smoking or attempting to quit smoking</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No weight gain or minimal change in weight experienced</td>
</tr>
</tbody>
</table>
c. Support

The third theme in conceptualizing the term ‘journey towards smoking cessation’ for the participants was labelled ‘support’. The theme ‘support’ was raised by the majority of those interviewed individually and in the focus groups. It appeared to link the themes ‘outlook to quitting’ and ‘the process of quitting’ together. The theme, ‘support’, was reported to exist even before a quit attempt, often setting the scene or influencing the ‘outlook to quitting’. In trying to define support, one participant from the study described it as “that hand that was, you know, was there…”. This was mentioned in reference to how support “meant a new start” or “it meant, well having tried a lot of times to quit smoking and it was an opportunity, to try something different”, quipped another two participants. Having support when the participant was ready to quit related to the theme ‘outlook to quitting’ and led to a more positive experience.

What attracted me to... when I saw an ad for the programme, was the duration. Because when I’ve done things in the past through the GP, it’s take it home and they may contact you a few weeks later and that’s it, once, and it’s within the first month or six weeks. This programme offered three-pronged support but for a year. And it’s the year bit that really made me think that I could not give this opportunity up. (FG1, female, 51)

For others, support was reported to be important at the end of a successful quit attempt. This allowed continuous motivation and encouragement for the participants to remain abstinent. Without this level of support at the end of the smoking cessation program, the participants reported that some faltered, felt abandoned and eventually relapsed.

But you really would just like that somebody would acknowledge that you’ve worked so hard to reach that point. (FG1, female, 51)

I wasn't meaning to say the other person wasn’t nice, it was just that it was psychologically that one person and that was secure in my mind, you know and then when it swaps to another person, it was just an excuse for me to think otherwise [to consider smoking again]. (FG1J, female, 41)

The participants reported in the interviews that one major reason for participation in the SCeMES was the perceived support which was to be provided throughout the course of the program. This was reported to be different from previous attempts which some of the participants had made, and a major source of positive experience for the current quit attempt.
I agree with you, I think it was the support and, for me personally… (FG1, female, 48)

So to be fair, I had XXX (name of therapist) and I found her very, very good too. So it was just everybody on it, although we had different people, it was supportive. (FG1, male, 52)

It just sort of gave me... because it was being studied it gave me an incentive to say, ‘Well actually, somebody’s gonna check up on what I’m doing.’ So that's what it’s done for me, it gave me that sort of boost to say, ‘Stay quit this time’. (FG2, male, 44)

When this perception was negated as related by FG1J above earlier, the experience of the program was more negative.

Two major categories which summed up the theme ‘support’ were whether the support was general or specific. General support was directly related to what the SCeMES program was able to provide in general terms in supporting the participants towards a successful quit attempt. A few of the reported SCeMES supporting features were the face-to-face nature of the program, the non-judgmental attitude, the professional demeanour of the therapist, the checking on their quitting, and the encouragement given during times of adversity. For some, the clear and concise structure of the SCeMES provided that indirect support: it was a year-long program, undertaken by trained staff, with a clear number of visits aimed at assisting them to quit smoking. When this structure was compromised as a result of staffing issues, which occurred suddenly as reported earlier by FG1J, the experience was less positive.

So I thought yeah, I really wanted to, yeah, I was quite committed to the idea of giving up smoking. And I think I was attracted by the fact that there were interviews and sort of like support that I could call if I wanted to talk, and there were I think was it five, five visits throughout the year, and I like the idea of that. So yeah. (Individual6, female, 46)

Yeah. Yeah, I think it comes down to more the overall effect that having that contact part of it, the spray and yeah the tone that gets you right from the start it’s been a different attitude of making the attempt. So I thought about it for quite a while and then you’ve done something and you’ve talked about it. Yeah, it’s another process. (Individual9, male, 63)

Specific support refers to specific providers of support such as family, friends, the therapist who was responsible for the care of the participants, and the community at large. Each specific support played a cumulative effect in motivating the participants to either initiate a quit attempt; continue in the program attempting to maintain their
quit attempt; or try another quit smoking attempt. For those participants who were abstinent, the specific support provided motivated them to continue abstinence.

When the discussion involved the SCeMES providers, the participants often compared the therapist they had had in the past with the ones they were assigned to in the SCeMES. Negative experiences with each quit smoking attempt were reported by the participants to be related strongly to a non-supportive, judgmental and often uncaring provider. Questions were also raised about why the government persisted with care (systems) which the participants felt to be unsupportive. A positive experience was when the participants related being cared for by the opposite type of therapist i.e. caring, non-judgmental etc.

Absolutely none and almost a negative thing is like, you go back to your GP after a lengthy period of time on whatever, and we haven't given up and its almost a sarcastic, ‘Oh I didn't think you would,’ but that's getting a little bit sort of... under my GP, yeah, oh yeah I knew you wouldn’t. (FG2, male, 56)

No, no, no; given it’s the same, I agree with you, they've got an awful lot and it’s... I know in the practices I've been involved in with the... you know giving up smoking, it was more like, ‘Well, go and see my nurse and they'll sort you out,’ so and it was, ‘Yeah, here's your box.’ Then you'd go back to your next box and it was, ‘Have you smoked while you've been on it?’ And you either sat there and lying to her or you know, whatever; and it was at the end of the day you think, ‘Oh... no.’ ‘Oh well that's good, then here’s your prescription.’ It was like, so if you weren’t truthful with her, she wasn't able to help you, whether she smoked or not; as you say but yeah, it was more... yeah, there's important things to do and smoking is a decision people make. Maybe, that's how you were made to feel and I think now... I know now, going back to the doctor and they'll say, ‘Are you still smoking?’ ‘Well no, actually I've been, not since June last year.’ ‘Oh good.’ And that's it, because it's not like, ‘Oh, congratulation.’ It's like, ‘well you certainly knock off.’ So yeah. (FG2, male, 44)

…and you didn’t make us actually feel... I didn’t feel guilty that I was a smoker when I came in because you were running this to try and get us to give up smoking and help us, I almost had this perception before I met you was that I'm gonna in there and you'll probably smell that I've just had a cigarette [Laughter] yeah and you’re probably gonna be like everybody does looking down at (muffled) you know and I really did have that thought until I met you and then I was okay. (FG1, female, 51)

It was all there, the genuineness of her helping; keep telling us, ‘You're doing fine,’ and that was the bit, the reassurance. (FG2, male, 56)

Support by both family and friends drew mixed responses. On the one hand it was mentioned as being helpful in initiating and maintaining the quit attempt; on the other hand, some reported that it was a source of stress.
Participants who experienced both general and specific support found them to be equally effective in assisting them quit smoking. Family and friends, however, needed to be sensitive to the participant’s needs in terms of encouraging them to continue staying abstinent.

Hmm…I get real shitty, upset at any little thing that happens…hmm… but then again, I’m more laid back to what I use to be. People don’t reckon I am. My family don’t reckon I am. I don’t know. But I’ve really had no help with my family. They have not encouraged me. (Individual2, female, 48)

As a result of their mood changes during withdrawals, a couple of participants reported on overly-supportive friends or family which they considered to be counterproductive in their quit attempt. Some had even lapsed as a result of this counterproductive support.

My own case, yeah, I did have a wee bit of mood swings. Felicity (pseudonym for wife) said to me on occasion you know where I would snap or say something and she’d say to me, which helped as well, she’d say to me, “Go and have a cigarette. (Individual3, male, 58)

I had times where I run out of cigarettes, where I was, say, on a shooting trip with me mates and me cigarettes got wet or something and we’re away for a few days. And then I’d say, ‘Oh well, I haven’t had any for a couple of three days, I’ll not have any more from now on.’ But I mean it never worked, you’d end up popping out somewhere, meeting up with the friends and what have you and they’d all be smoking. Someone would offer you one, ‘Oh, all right.’ And back to it I went. Yeah, so that’s about it. (Individual3, male, 58)

There were, however, opposite reports of both family and friends who were protective of the participants’ current quit attempt and allowed them to stay abstinent for a longer period than they normally would last.

Oh good, yeah. I have a friend, and just as a joke I said… oh, it was a few months ago, we went out and I think she’d been smoking quite a lot, and I said, ‘Oh give me one.’ And she looked at me, but she didn’t bat an eyelid and she gave me the packet. I said, ‘No, I was only kidding.’ And I said, ‘You would have let me have one?’ She said, ‘Make your own decision.’ She said, ‘I would have been disappointed, but I wouldn’t have said anything.’ I thought, ‘Oh that’s interesting’. (Individual6, female 46)

Well, I tell you what, there’s been a few times when I said, ‘God I wished I had a smoke.’ My daughter said, ‘Well if you start that again mate you’ll be out’. (Individual9, male, 63)

The final subcategory to illustrate what specific support meant to the participants was community support. The community at large was found to play their part in either
supporting the participant to stay abstinent or relapse. The participants reported that encouraging words were felt to be more helpful than disparaging ones. Also, continuous support was raised during the interviews. More often than not, the non-smoking public in particular, were keen to assist smokers to quit smoking, but were less responsive to their successes when they had quit. For some participants, having the continuous encouragement was reported to be useful for them to maintain abstinence.

Even after February the 22\textsuperscript{nd}, after that quake I was in town, I didn’t make a conscious decision to smoke. But a smoker brought me one up and said, ‘You’ll need this’. (FG1, female, 48)

Well that’s the only thing people have said to me, they never said, ‘Good on you,’ or, ‘Well done,’ or anything, they just said, ‘Oh, so have you put on weight?’ ‘Oh yeah you’re looking at the... yeah, they’ll probably put on weight’. (FG1, female, 41)
Table 11.5: Matrix display for the theme Support

<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Codes</th>
<th>Explanation for the category</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Structure SCeMES</td>
<td></td>
<td>In relation to the support structure of the SCeMES which the participants felt was either helpful or unhelpful during their quit attempt</td>
</tr>
<tr>
<td></td>
<td>Community</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific</td>
<td>Family</td>
<td></td>
<td>In relation to the specific support which the participants felt was either helpful or unhelpful during their quit attempt</td>
</tr>
<tr>
<td></td>
<td>Friend</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Provider</td>
<td>System Therapist</td>
<td></td>
</tr>
</tbody>
</table>
11.8.6 Summary for Smoking Cessation

The study found that the participants’ experience of smoking cessation in the SCeMES-QL consisted of three major themes, labelled thematically as ‘the outlook to quitting’, ‘the process of quitting’ and ‘support’. All three interacted together to enable either a positive or negative experience of quitting smoking to occur. This experience, however, did not necessarily dictate the smoking cessation outcome. Instead, a positive or negative experience was found in the study to be important, for possible future quit attempts for those who failed to become abstinent in their current attempt. This was seen in the case of the participant (FG3, female, 47) who was smoking at the time of the recruitment for SCeMES-QL, but then made a new quit attempt during the course of the interview period. This was as a result of her more positive experience in quitting. On the contrary, another participant (FG3, male, 49) was not considering a quit attempt anytime in the near future as a result of his more negative experience.

The themes ‘outlook to quitting’ and ‘process of quitting’ were linked with the theme ‘support’. Both initial themes, nonetheless, were able to shape the smoking cessation experience on their own. If the participant was thought to have a ‘match expectation’ in terms of their readiness to quit and had adequate information, it was likely that the participant related more positive quit smoking experience irrespective of the process of quitting smoking. Similarly, a positive experience through the ‘process of quitting’ might be reported, despite a negative experience at the stage of ‘outlook to quitting’. In the ‘process of quitting’, the undesired consequences of quitting were also explored. There was however little suggestions that depression was a considerable factor in the quit smoking process. Weight gain in particular, however, was of more concern with more respondents reacting to the issue. It appeared to feature strongly within the participants as reasons not to quit smoking in the first place and also a factor in both discontinuation of the smoking cessation program and falling back into reinstating their smoking. Nevertheless, there was little indication to suggest that the weight concerns were related to food addiction. In spite of that, an issue which emerged was the use of the NEEDNT to monitor their diet as opposed to assessing their food intake and this might have changed their behaviour somewhat. A third theme which emerged was ‘support’. If the theme ‘support’ was less than desired, it appeared that the determining factor for the two themes resulted in a contradicting experiences for the participants. This was seen to be the case for a participant (FG1,
female, 41) who had a negative experience at the beginning, but a positive experience during the ‘process for quitting’, but was not supported. As a result of the perceived lack of support provided to her, her experience in smoking cessation was considered negative as she felt abandoned midway and she therefore subsequently relapsed. The difference and determining factor for her whole ‘journey towards smoking cessation’ experience was the theme ‘support’. This theme played a larger role than the other two themes that conceptualised what was meant by ‘smoking cessation’ by the participants in the SCeMES-QL.

11.9 Prejudice

The second domain, which emerged from the data when exploring the lived-experience of smokers quitting in the SCeMES-QL, was labelled as ‘perceived prejudice’. The theme ‘perceived prejudice’ was associated with the participants recounting their experience and encounters of being judged during their smoking cessation journey. This experience was in response, not only to the decision to smoke, but also the decision to quit smoking.

I guess the one thing that really, really annoys me and you won’t die wondering this.... if you do, but I smoke and I get ostracized for smoking by people who don’t smoke. (FG1, male, 52)

But I don’t know, part of me thinks poor old smokers are getting picked on a little, and there’s certainly other causes that are worthy of attention. (Individual6, female, 46)

Perceived prejudice was noticed to be shown not only by non-smokers within the community, but also by ex-smokers. There were also participants who related that they themselves had started to discriminate against other smokers once they had become ex-smokers.

FG1a: “Or an ex-smoker.”
FG1b: “Oh, they’re worse.”
FG1a: “They’re worse are they?”
FG1c: “Yeah, they’re worse.”

(FG1 participants)
From the interviews, three major categories emerged from the SCeMES-QL to support and further illustrate this domain. The first category which emerged was ‘the appraiser’. This category was divided into multiple subcategories: smokers, ex-smokers and non-smokers. The participants related that with ‘appraisers’ labelled as smokers or ex-smokers in the subcategory, the ‘perceived prejudice’ was not only seen, but it was also felt. From the interviews with the participants, often smokers were more critical of other smokers when they attempted to quit smoking. On the other hand, there were also those (smokers) who did encourage other smokers to quit, but this was not experienced as frequently by the participants in this study.

Unexpectedly, however, there were participants who reported to personally becoming one of these individuals (‘the appraiser’) once they became abstinent. For some of these participants, they related to becoming “holier than thou”, much to their chagrin.

I can understand that. My son, I have got a little bit holier than thou with him. He’s 18. (FG2, male, 55)

So my friends, all my mates I say to them you know, if I hear them coughing and spluttering I say, ‘You should give those bloody things away.’ But I suppose I shouldn’t, but I do. (Individual3, male, 58)

At the extreme end, a number of the participants became advocates and champions of quitting smoking. Some appeared to do advocacy for quit smoking even more so than the non-smokers. For those still smoking, this advocacy was not taken very well at times despite the good intentions.

Smokers in the study who were interviewed reported feeling a sense of judgement upon them, especially amongst those who were unable to quit smoking as easily as some of their peers.

I had one son that carried on smoking, you know, and he’d smoke and he’d smoke and it would come into my house and I don’t think that was fair, you know. Now he’s come back….well, he’s moving out shortly but he won’t…he’s not allowed to smoke. Well, he came back just before Christmas in November and I set the rules, no smoking in my property. No one is allowed to smoke in my property because I don’t see why they should. I’ve still got to get over this. Once I’m over two years, I think I should be right… touch wood (laughter). (Individual2, Female, 48)

I think to be honest, I think they need, whoever it is, whether it be Zonnic, Quitline, whatever, I think they need to be full frontal, full on and go straight for it and show graphic pictures and people with asthmas and really turn it on. Because people…and then you’ll have people saying; you need everyone saying; everyone who’s a non-smoker needs to say to a smoker, ‘Put that
stinking thing out.’ You know I think it would be a big help if non-smokers said to smokers, ‘Give up, get out of it.’ (Individual3, male, 58)

In the subcategory non-smokers, ‘perceived prejudice’ was reported to be both seen and unseen. Similar to the ‘perceived prejudice’ reported by ex-smokers towards those still smoking, the unseen ‘perceived prejudice’ was felt through the use of tobacco control policies on them (the participants). The participants related to being “an easy target” by policies implemented by “big brother known also as the government”. For some of them, the latest policy, Smoke-free 2025 initiative, was especially felt. This initiative had ‘targeted’ them through multiple avenues such as tobacco taxes, smoke free public places, pictorial warnings and point-of-sale bans to name a few. As New Zealand moves towards a smoke-free nation, it was in the minds of the participants that the current feeling will increase.

It’s like, I don’t know… its saying, right, you do wrong and you do right, sort of thing, but we could break that down into everybody’s habits, but… so probably on the anti-side. It’s like me; I work at the University, now we’ve gotta walk off the grounds. I mean, it’s got that bad. So, it’s… um. (FG3, male, 49)

I really can’t see that, that… if you want a packet of smokes you’re going to buy them, whether you can see them or not. Like even giving up, if I’d gone into a service station and couldn’t see the smokes, it would be no different seeing them, then walking in and seeing the cupboard, and knowing that the smokes are behind that cupboard, just thought, temptation’s still there. I just think it is pointless. But they’ve obviously got their reasons for it, so yeah. (Individual3, female, 56)

Well, I think they are, because they have to be. I think boxed-in in the sense… you’re not talking about (hospital name) staff aren’t you? (Individual6, female, 46)

Those who had quit and were now abstinent (ex-smokers) reported understanding the reasoning behind such policies, while others (those still smoking) related to being pushed into a corner and having no place to go.

Certainly when I would hear things like, they want to bring in a more… or it would be illegal to smoke in your car with children, or would I read or did I hear that they, that duty free cigarettes were going to be stopped, something like that. I would feel profoundly irritated, yeah. (Individual6, female, 46)

The next subcategory was labelled ‘response’ to denote the response of the participants towards the prejudice meted out to them. The initial response was often reported as a wave of emotions from anger to annoyance, frustration, guilt and
feeling like a failure. This was identified as the subcategory ‘emotional roller-coaster’ and one participant summed up how most of them all felt: "society hates us!"

It’s just… people’s opinion…..they just try and make themselves right and us wrong. That’s where I get anti because you haven't looked at the whole situation. (FG3, male, 49)

What annoys me about it is they say, 'We’re doing this to save your health 'cause our hospitals are full and it’s costing millions of dollars.' Well, I’ve never been to the public hospital for anything. (FG1, male, 52)

You're a leper. Without them being behind the wall. (FG1, female, 48)

…that's at work. I got no issues with my new job, they think I'm a non-smoker. And I think I'm gonna keep it up, I'm doing well. (FG1, female, 65)

For some, their response was more physical; they felt they needed to do something, to rebel. As a result of the perceived prejudice against them, the participants reported to be “more anti it (tobacco control messages)”, as one participant stated, which further illustrated the feelings of anger and frustration. Some of the participants reported that they were planning to grow their own tobacco, and one participant responded defiantly by saying “migrate to another country”.

FG3a: I’ve got a lifestyle block; I might have to start growing them there. I’d make a fortune here.

FG3b: Can I join you there?

(Response by two participants, FG3, male, 49 and FG3, female, 47)

The final subcategory, which emerged was labelled as ‘repercussion’. This subcategory related to the effects of prejudice towards the participants. The main repercussion was the sense of being persecuted for smoking.

Well, it’s like discriminating somebody... Well, they just judge us all the time. (FG3, male, 49)

The researcher: 'And when you said that smokers were being picked on…

Individual6: ‘Oh it's not so much picked on, but they're targeted!' (Individual6, female, 46)

Just in the fact of …..ah... what, are you doing mate? You know, you get sick of the comments, ‘Oh you stink of smoke.’ ….Or you spend so much money on the actual cigarettes itself and it's not sort of doing any good for you either. (Individual7, male, 33)
Alcohol was seen by the participants to be as dangerous, if not more dangerous, to society as tobacco smoking. Despite this, the participants reported that the government was targeting the “passive” smoker. This feeling of injustice increased towards the authorities, particularly the government, regarding the perceived double standards with alcohol use in New Zealand.

Family violence and others...full of people that have done things under the influence of alcohol. (FG1, female, 48)

The hospital’s full of people that are sick and you know and it’s not us ‘cause we’d go privately, but there’s... well, I say there is more people in hospital as a result of alcohol related traffic accidents, or whatever than there is smoking. (FG1, male, 52)

But I do think that the more products, if you like, that are available that don’t cost the earth... but I still have trouble today with the fact that alcohol is allowed to be advertised on television. And they’re showing you on the Good Morning show how to make some drink with vodka, which I think is absolutely disgusting. That they can advertise in the paper the alcohol, which we know kills brain cells, to excess if you’re drinking it to excess. (Individual8, male, 70)

I mean I’ve written to Tariana Turia (Minister of Health) recently, or emailed her, to say when did you last hear of somebody driving and smoking and killing someone; compared to somebody drinking and driving and killing someone. So which is the worst? (Individual8, male, 70)

No. And you know, the Government gets kickbacks from it so they trying to, on one hand stop us but look at the taxes they’re collecting and it’s wrong. If they really want this out of people’s faces, change it. (FG3, female, 47)

As a result of these perceived prejudice and double standard practices, those interviewed reported that smokers (within the study and outside) tended to stick together. This inadvertently created more ‘perceived prejudice’ when participants attempted to quit smoking.

In summary, ‘perceived prejudice’ as a domain emerged from the data and was an unexpected but important finding in the ‘journey towards smoking cessation’ of the SCeMES-QL participants. The sense of discrimination was present and felt throughout the ‘journey towards smoking cessation’, happening even before their quit attempt but continuing long after quitting smoking. More importantly, the understanding of perceived prejudice in this journey was crucial, considering the role it played in influencing every aspect of what constituted ‘smoking cessation’ mentioned earlier.
<table>
<thead>
<tr>
<th>Category</th>
<th>Subcategory</th>
<th>Codes</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The appraiser</td>
<td>Smoker</td>
<td>Seen</td>
<td>Included all participants who were smokers at the start of the study and those who were still smoking during the SCeMES-QL</td>
</tr>
<tr>
<td></td>
<td>Ex-smokers</td>
<td>Seen</td>
<td>Those participants who were abstinent as a result of their participation with the SCeMES-QL</td>
</tr>
<tr>
<td></td>
<td>Non-smoker</td>
<td>Seen</td>
<td>Non-smokers who were not part of the SCeMES-QL but whom the participants had made contact with in their lifetime</td>
</tr>
<tr>
<td>Response</td>
<td>Emotional roller-coaster</td>
<td>Anger, Annoyed, Embarrassment, Feeling like a failure, Guilt</td>
<td>The emotions reported by the participants in response to prejudice</td>
</tr>
<tr>
<td>Rebel</td>
<td>Grow own</td>
<td></td>
<td>The physical response reported by the participants in response to prejudice</td>
</tr>
<tr>
<td></td>
<td>Migrate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repercussion</td>
<td>Ganging up</td>
<td></td>
<td>The description of smokers who stick together as a response to prejudice in society against them</td>
</tr>
<tr>
<td>Persecution</td>
<td>Double standard</td>
<td></td>
<td>The description of the injustice towards smokers by mitigations of prejudice</td>
</tr>
</tbody>
</table>
11.10 Unprecedented Life Event

The SCeMES, and the participants attempting to quit smoking in it are unique, as the study crossed paths with the Christchurch earthquakes of 2010 and 2011. As this event was prominent, and an issue which was not able to be ignored in every interview whether FG or individual interviews, it was considered to be the third and final domain in understanding what it meant to quit in the SCeMES. The domain was labelled ‘unprecedented life event’ as it was meant to reflect the period of the Christchurch earthquakes, which was unprecedented, and also those who attempted to quit smoking during this period.

This domain was further explained by two categories which were based on the period of quitting for the participants of the SCeMES: during, and after, the periods of earthquakes.

During the periods of earthquakes, the first category for the domain “unprecedented life event”, the major theme which emerged was ‘confusion’. Confusion during this unprecedented event was understood by the participants to mean uncertainty during the earthquakes. The earthquake of interest was primarily the earthquake of February 2011, although participants were involved with the September 2010 earthquake as well. During the much reported earthquake of February 2011, a large number of the participants reported lapsing either because of themselves, or indirectly by other people.

For most participants and the researcher, this period was confusing, as it was essentially the first time that both the participants and the researcher were involved in, and directly affected by, an earthquake in Christchurch as this area had not experienced such a severe earthquake before.

Um… I think probably just the stress of the situation. It wasn’t… I mean, I wasn’t in the position where I lost my home or lost anybody or anything like that. But I think the sort of uncertain nature. (Individual1, female, 48)

I could have [quit smoking], but I didn’t want to. I guess it was really sort of just the shock of, this has actually happened to us in Christchurch, and how lucky I guess I felt that I came away unscathed, and yeah. And of course everything, everything was sort of turned upside down. (Individual6, female, 46)

It was, that’s exactly what it was. It was a break, think about what you’re doing and well I guess I’m a policeman and as soon as you put on that police jacket, especially in the February quake everybody looks to you for, they know what to do; they know how to do it. And we get no training down at ….and I've gotta... I
mean we did really, really well, but I found it really, really stressful, being responsible for everybody else as well. (FG1, female, 51)

The second category was ‘post-earthquake’, the period after the earthquakes of February 2011. This phase included the subsequent and continuous aftershocks, and the two earthquakes of June and December of the same year. The main theme to emerge during this phase was described as ‘earthquake fatigue’. This was related to the interference of daily life in Christchurch as a result of both the thousands of aftershocks, and also the damage and destruction that these constant mini-earthquakes caused. This damage included damage to both personal homes and neighbourhoods, and also damage to local infrastructure such as roads and buildings. This damage resulted in the participants having difficulties going to work, conducting their normal daily commute, and also visiting the NAC for follow-up appointments. This same theme of ‘earthquake fatigue’ has continued during the Christchurch rebuild phase – an enormous project of fixing the damage caused by the earthquakes.

Not too bad, but just the timing that the earthquakes as well, I don’t think you could give up smoking when you’re also dealing with very traumatic thing. And my house was a rebuild in September, so I mean I’m still no further on now, two years down the track, and I’m no closer to anything than what I was then. Yeah, so you know it’s not just giving up smoking, you’ve got a lot else going on as well. Not as bad as some people, don’t get me wrong, I’ve been very lucky compared to some people. But yeah. (Individual5, female, 56)

Both the stressful period of the earthquake and the period after, which included aftershocks, were explained with a theme labelled as ‘earthquake tension’. This theme described the strain which the earthquakes and their consequences had on each of the participants. The effects of this experience later resulted in the presence or absence of what was described by the participants as “a new look to life”. This ‘new look to life’ or new thinking could be likened to both mental toughness and staying power. All participants who continued with the SCeMES-QL interviews reported the strength to keep on going as a factor in their continued interest in the study.

No, no. But I do believe it’s played a major part in it here for us, and it’s been a big help in some ways, but it’s the wanting to give up that’s the biggest thing. (FG2, male, 60)

Hugely for me. Basically I thought, ‘Bugger this. If this is what life is going to be like then who knows what’s going to happen tomorrow, I’m going to smoke.’ And I
kind of got this attitude and I know it sounds stupid but that I’m going to smoke until the end of 2012. And if we all wake up, we’re fine with it, first of January 2013 then I might look at giving up in the end, but I just think, ‘Why put myself through this huge stress when tomorrow I could be crushed by a falling building?’ You know, and I know that’s a horrible way to think but that is how I feel very strongly. (FG3, female, 41)

I think adversity, a wee bit of… I mean my house is buggered, in bits and pieces like this well I just... the smoking part of it I could have let go and carried on smoking but I had to be strong with that as well. I mean I’ve got a lot of damage to my house and I’ve still got issues with that as I speak. Just smoking wasn’t helping either, you know, I mean it just... it was just another thing you know. (Individual5, female, 56)

To summarise, the earthquakes, although a major event for all participants, did not appear to be a major contribution for blame towards their success or failure to quit smoking. The participants reported this major life event as being unprecedented without adding too much emotive connotation with regards to smoking cessation. This approach, therefore, allowed the participants to remove blaming the earthquakes for the success or failure to be abstinent at the end of the study. The participants, however, acknowledged the earthquakes played a big part in their quit smoking journey.

No, no. But I do believe it’s played a major part in it here for us, and it’s been a big help in some ways, but it’s the wanting to give up that’s the biggest thing. No, I can’t say that with the earthquakes, that it made me feel that I wanted to go back to smoking, yeah. But in saying that, prior to everything, there was no way in the world, I would have thought, that I could give up through something like what we’ve had, yeah. (Individual5, male, 56)
<table>
<thead>
<tr>
<th>Timeline</th>
<th>Category</th>
<th>Codes</th>
<th>Explanation for category</th>
</tr>
</thead>
<tbody>
<tr>
<td>During the earthquake</td>
<td>The Christchurch earthquake</td>
<td></td>
<td>How the Christchurch earthquake directly affected the lives of the participants</td>
</tr>
<tr>
<td></td>
<td>Confusion</td>
<td></td>
<td>To describe the confusion and uncertainty as a result of the earthquake</td>
</tr>
<tr>
<td>Post-earthquake</td>
<td>Aftershocks</td>
<td>Not ready, Ambivalent, Overwhelmed, Priorities</td>
<td>To describe the effects of the aftershocks on the participants</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Post-quake recovery</td>
<td>Road works, House renovation, Work</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>To describe the effects of the recovery or activities after the earthquake on the participants</td>
</tr>
<tr>
<td>Throughout the earthquake</td>
<td>A new look at life</td>
<td>Earthquake tension, Mental toughness, Resilience</td>
<td>To explain how the earthquake had changed the way participants viewed life in general in spite of the adversity</td>
</tr>
</tbody>
</table>
The SCeMES-QL found the ‘lived experience’ to quit smoking consisted of three domains and five major themes. The three domains were labelled as ‘smoking cessation’, ‘perceived prejudice’ and ‘unprecedented life event’. For the domain smoking cessation, the interviews found three themes each labelled as ‘the outlook of quitting’, ‘the process for quitting’ and ‘support’. The latter theme ‘support’ bonded the three themes together and explained the experience of what it was like to quit smoking by the participants in the study.

For the participants, the experience to quit smoking through the SCeMES was likened to a journey rather than a destination, i.e. obtaining an outcome of abstinent from smoking or not. This finding was different from what the researcher had anticipated at the beginning of the conduct of the study.

The three variables of interest, namely quitting, depression and weight did not find much inter-relationship in this qualitative study. There was little information on the role of depression in a quit attempt, but more issues on weight gain. However, there was also little on the role of food addiction as a cause for weight gained.

From the information gathered, it appeared that the experience of quitting smoking for the participants in the SCeMES-QL comprised of the domain smoking cessation which was the main reason to participate in the first place. This domain, if imagined as the core of the experience, is surrounded by the second domain, perceived prejudice. The second domain is all inclusive as the participants reported this theme to be felt prior, during and after their attempt to quit smoking. More importantly, it was not only seen and felt directly by some of the participants, but was also reported to be unseen and felt indirectly by all the participants of the study.

To complete the experience of quitting smoking for the participants, both domains ‘smoking cessation’ and ‘perceived prejudice’ are covered by the final domain, ‘unprecedented life event’. It is more likened to an umbrella rather than a complete circle encircling the two earlier domains. An umbrella analogy is probably best because, although the Christchurch earthquakes were a major life event for participants in this quit smoking journey, there were other issues which were also happening at the time, which may not be linked to the earthquakes. The earthquakes were a major unprecedented life event not only for the participants of the study but to
the researcher as well. This event was the unique aspect and finding from the SCeMES-QL.
DISCUSSION, IMPLICATIONS FOR PRACTICE, FUTURE RESEARCH AND CONCLUSION
CHAPTER 12 – Discussion

12.1 Chapter Overview

This is the final chapter for the SCeMES and attempts to explain the research findings from both the quantitative and also the qualitative components. The main objectives are highlighted and discussed in this chapter. Finally this chapter ends with a discussion on the limitations and strengths of the SCeMES before suggestions on both future research and implications for practice.

12.2 Introduction

This study was mainly aimed at investigating the role of depression, weight and smoking cessation amongst a population in Christchurch who were involved in a quit smoking program in New Zealand. It was the objective of this thesis to find the rate of depression and its association with quitting smoking, to find any relationship between the eating variables in particular weight, and its role towards quitting smoking and finally to investigate the inter-relationship between the three variables. This study was a mixed method research study which was sequential in design, meaning, it had two methodological philosophies organised in a linear fashion with the quantitative study at the fore followed by a qualitative study. The latter was designed to explore and document the ‘lived experience’ of the participants in their quit attempt through the SCeMES. This study allowed insight into what it meant to quit smoking in the SCeMES, to quit smoking in New Zealand after the Māori Affairs Select Committee report and to quit smoking in Christchurch during the period of the Christchurch earthquakes. A total of 556 participants were eligible for the SCeMES and 256 participants were recruited into the SCeMES-QN. Of these, 78 participants were subsequently eligible to participate in the SCeMES-QL, however, nearly a third (n=25) participated as interviewees in both the face-to-face or group interviews.

12.3 Main Findings

12.3.1 Outcome Measures

This study had two measurable outcomes for success which were retention and abstinence. Most smoking cessation studies measure abstinence, however, it was felt that retention was equally important considering that from a clinical perspective retention ensured that treatment was able to be given adequately. Although useful,
an abstinence only outcome measure might not be able to give that information. For the SCeMES two follow-up periods was proposed namely EARLY and LATE follow-ups. For EARLY follow-up, the average duration was three months (M = 93, SD = 34.3 days) and for LATE follow-up, the average duration to follow-up was a year (M = 380, SD = 84 days). The retention rate was found to be 48.4% and 36.7% respectively, at both follow-up periods. Abstinence on the other hand was measured using the 7-day point prevalence, an often used measure of abstinence in a clinical setting. Abstinence was further validated with a carbon monoxide monitor at < 10 ppm. For the SCeMES, the abstinence rates were 14.5% and 14.8% respectively for EARLY and LATE follow-up.

12.3.2 Depression and Smoking Cessation Outcomes

One of the major thesis findings of interest was the rate of depression amongst smokers who were planning to quit smoking in Christchurch, New Zealand. The rate of depression was reported as lifetime depression and current depression. 35.7% of participants were found to have lifetime depression and the findings from the SCeMES was higher than the national average reported to be between 14-16% (Ministry of Health, 2012; Oakley et al., 2006). These findings were in keeping with the current understanding of mentally ill patients smoking at least double the rates of those without any mental illness (Ziedonis et al., 2008), and also in keeping with the rates of smoking in those with clinical depression reported globally in Table 4.2. Another study in New Zealand by Glover (2005), also reported a prevalence of 30% in her sample of 130 Māori smokers. In that study, however, the diagnosis of depression was made using the Māori worldview, the 4 realms of the Te Whare Tapa Wha (Glover, 2005), for defining depression. Unlike the conventional diagnosis of depression made using the DSM-IV or ICD-10, the Māori worldview model included four categories of experience, namely the physical element, the psychological component which included feelings and thoughts, a spiritual component and that his condition was closely related to family and the wider community for which these people belonged to. It is unclear whether both methods were correlated and this made direct comparison of the findings difficult. In another study by Tobias et al. (2008), involving a general community sample of 12,992 adults using the New Zealand Mental Health Survey, 33% of smokers had a mental illness. These findings again was supportive of both the findings in this study and Glover (2005). In the study by Tobias et al. (2008), however, it was estimated that those with mental illness were
50% more likely to smoke compared to those without mental illness during the study period. The similarities with the SCeMES for this study was that Tobias et al. (2008) used the CIDI, an instrument which was based on the DSM-IV, a conventional tool to diagnose depression.

Compared to lifetime depression, the rate of current clinical depression was found to be much lower (Oakley et al., 2006). It is worth highlighting that between the two, current depression is often studied less compared to lifetime depression. Current depression is also less affected by socioeconomic wealth and was often more similar from country to country (Kessler & Bromet, 2013). In the SCeMES-QN, the rate of depression at enrolment differed depending on the instrument to detect depression that was being used. In this study, current depression was reported to be 2.3% and 6.6% respectively using the HADSD or the BD-II respectively. This was significantly lesser compared to lifetime depression among smokers reported earlier, however, it was still within the wide range of 2 - 34.3% reported elsewhere (Table 4.2). Nevertheless, the rate reported in the SCeMES is within the lower end of the spectrum in Table 4.2, but is clearly at the lower end of the range. The rates of current depression in the SCeMES was almost similar to current depression within the general population (6.9%) (Oakley 2006) if BDI-II was used (6.6%), and lower with HADSD (2.3%). It was possible that those with current depression in this study were those with mild depression and therefore more likely to be able to participate in the study. Those with moderate to severe depression were unlikely to want to make a quit attempt. One significant statement by a participants of the SCeMES-QL (Refer to 11.8.5.1), where she describes that if she were in a ‘dark place’ with her depression, it would be unlikely that she will consider quitting as opposed to when her depression is controlled.

One other interest in this research was the possibility of an increase in depression during the quit smoking process. It was initially anticipated that depression prevalence would increase over time, however, this was not found in this study. The SCeMES did not support the idea that smoking cessation increases depression rates as there was no increase in depression over the three months or at one year follow-up. This was similar to the study by Tsoh et al. (2000), which found no increase in rates of depression in either those who were abstinent or not at 12 month follow-up. Community based studies also found no increase in rates of depression in both those abstinent or not at <3, 3 or 6 to 9 months follow-up (Bolam et al., 2011; Shahab et al.,
Further insight into this finding can be found in the qualitative component of the SCeMES. Amongst the participants interviewed, clinical depression did not feature prominently at all as a consequence of quitting. Participants did report having depressive symptoms as a symptom of withdrawal and this was reported more so in the early stage of quitting. Even those participants with a previous history of clinical depression did not report that their depression worsened or reappeared during the course of the SCeMES-QL. This is important and reiterate the need to encourage and treat people with depression for their smoking. The recent study by Anthenelli et al. (2016), reports that there are no neuropsychiatric complications with any of the currently available smoking cessation treatment. Furthermore, Taylor et al. (2014) found in their review that smoking cessation reduces depression and increases positive mood apart from quality of life. Therefore, our negative findings further supports treating people with depression who smoke.

Apart from the rate of depression amongst smokers, this study aimed to investigate if depression had any effect on successful quitting and whether there were predictors which were identified to assist in future quit attempts. The SCeMES-QN unfortunately did not find any association between having depression and the measured outcomes for smoking cessation in the SCeMES at both three months and one year respectively. When lifetime depression and current depression were analysed for any association with smoking cessation outcomes, there were no associations found between these two variables with either successful smoking cessation or retention in the study. These findings were in line with an earlier study by Hitsman et al. (2003), which found no association between lifetime depression and smoking cessation although in their more recent re-analysis of the same studies together with the addition of newer studies there appeared to be a modest effect of depression predicting lower quit rates (Hitsman et al., 2013). The findings in SCeMES although negative, is helpful considering much of the current information on depression and smoking cessation is based on clinical trial information which often includes strict protocols and may not mimic the real-world clinical setting. The SCeMES being a primarily longitudinal observational cohort study is possibly more generalizable and can provide additional information since observational and cohort studies are often less studied in investigating the role of depression and smoking cessation (Ziedonis et al., 2008). The SCeMES-QL also did not find support that depression or depressive symptoms experienced during the study period affected the outcome for the participants interviewed, despite the high rates of lifetime depression (56%) in the
qualitative sample. Rae, Pettey, Aubry, and Stol (2015) reported similar findings in their study. However, participants of SCeMES-QL did report of grief feeling as a result of quitting. This was also found in another study investigating smoking cessation within a community psychiatric setting (Lawn et al., 2002). In this particular study, the feeling was attributed to loss and was not reported to be clinical depression in any way. In order to explain the SCeMES findings, it was possible that the population who were interviewed, whom comprised mainly of those still present in Christchurch after the many earthquakes were different in features such as coping mechanisms, and therefore attributed little of their depression to their smoking outcome. Adams-Hutcheson (2015) reported that inhabitants of Christchurch who moved away from Christchurch after the earthquakes were found to suffer more from post-traumatic disorders, compared to those who stayed back. They were also more unsure about their future. Both factors may lend support to the notion that those who stayed back in Christchurch were slightly different from those who had left Christchurch after the earthquake. To further support the idea that participants in the SCeMES may be different was the study by Wilson (2013), describing resilience in the ‘survivors’. These survivors were reported to appear to have better individual resilience compared to community resilience. Resilience according to Wilson (2013), described the capacity to absorb disturbances and reorganize while still undergoing change to retain essentially the same function, structure, identity and feedback. It was possible that from the description by Wilson (2013) those remaining in Christchurch were a more resilient group which accounted for some of these negative findings in both the quantitative and qualitative study.

12.3.3 Eating and Smoking Cessation

The SCeMES measured weight and other eating variables, including the possibility of food addiction as a result of weight changes in the study. The baseline weight was 80kg and the average BMI was 27.4, by definition considered overweight. Observing the BMI of those with BMI >25, almost two thirds of the study participants had excessive weight to begin with. These findings mimic the current situation in New Zealand in terms of weight (University of Otago & Ministry of Health, 2011) and therefore representative of the general population.

There was a positive relationship between weight gain and smoking cessation in this study. The majority of the participants were found to be heavier at both follow-up periods compared to their baseline weight. For those who were abstinent, their
weight was significantly greater at both three month (3.3kg) and one-year (4.5kg) follow-ups compared to those who did not quit at the follow-up assessment periods (1.1kg and 1.8kg respectively). These changes were also found to be statistically significant and in keeping with other studies reported elsewhere (Filozof, Fernández Pinilla, & Fernández-Cruz, 2004; Mohammad Siahpush et al., 2013).

In addition, compared to their initial baseline weight, participants were found to be heavier overall at follow-up irrespective of their smoking status. One possibility might be any level of abstinence period, whether complete (7-day point prevalence) or incomplete between baseline visit and either EARLY or LATE follow-up period resulted in weight gain, although the mechanism for this was not well understood. Another possible hypothesis postulated was ‘gateway behaviour’ whereby Kaufman et al. (2011) argued that smokers in general were prone to unhealthy lifestyle options. These options include poor eating habits and a sedentary lifestyle and more importantly, were often difficult to change within a short period. Considering that the current study was an observational study where no intervention was given, it was possible that weight gain might have happened as a result of these unhealthy choices. Furthermore, this population which was heavier to begin with, might already be susceptible to weight gain (John et al., 2006). One other possibility was that frequent attempts to quit within the current study period may have increased the weight incrementally and was picked up during the frequent follow-ups conducted in the SCeMES. Alternatively, the weight gain seen could be the result of normal aging. Mozaffarian, Hao, Rimm, Willett, and Hu (2011), found in their study of >100,000 participants that both men and women gained weight over a four year period but the weight gain was lesser compared to those within the study cohort who quit smoking. Apart from metabolic changes (Finkel, 2015), weight changes were the consequences of lifestyle factors (Mozaffarian et al., 2011).

The SCeMES-QL found that participants when discussing weight often mentioned that food tasted better during quit attempts (particularly in those who were abstinent). One even mentioned, “taste that I never knew was there”, particularly in those who were abstinent. This was supported in other qualitative studies as a negative consequence of quitting which participants had experienced (Bommele et al., 2014; Twyman, Bonevski, Paul, & Bryant, 2014). In the SCeMES-QL, the participants mentioned that they ate more, irrespective of whether they were abstinent or still smoking as reported in the SCeMES-QN. It was possible that participants consumed
more food in general and not specifically just NEEDNT type foods as a result of this change in taste as the NEEDNT scores reduced over time. Together with the minimal mention of any increase in physical activities through exercise for example, this energy imbalance may be another factor for the general weight gain in both groups (Rupprecht, Donny, & Sved, 2015). The ‘gateway behaviour’ hypothesis (Kaufman et al., 2011) might also provide an alternative explanation considering behavior change takes a longer period of time than just the follow-up period of the study.

Another possibility for weight gain which had been postulated (Audrain-McGovern & Benowitz, 2011) but never formally studied was the substitution of nicotine for food. There was no evidence of this found in this study. Hardly any participants met the diagnosis for food addiction (<1%) at baseline and there was no increase at both follow-up period of 3 month and one year. Two possible reasons to explain this finding were 1) there was no co-morbidity with food addiction amongst current smokers and 2) there was no substitution in addiction between nicotine and food. It is possible that even though food addiction shares the same aetiology for addiction i.e. the dopamine theory (N. D. Volkow et al., 2013), the mechanism of action or the neurotransmitters affected might be different. These findings, however, were preliminary and more studies were needed to understand the possibility of substituting addiction for smoking cessation.

This study was also interested in investigating the role of eating, in particular weight gain, and its association with quit smoking and possible predictors for future smoking cessation attempts. There was no association found between any of the studied eating variables and quitting smoking in this study. Analysis of weight particularly did not find any association with either abstinence or retention in this study. In light of the retention rate reported at <50% in both EARLY and LATE follow-ups, findings in relation to quit rates needed to be interpreted with caution. It is possible that those who had the greatest weight gains dropped out earlier from the study and therefore significantly reduced the power to detect changes during analysis. Alternatively, further inclusion of other predictors for eating variables such as fear of weight on initial assessment might have been useful as a predictive factor. Additional analysis of the WISDM weight subsets did not find any association to successful quitting in this study. The WISDM weight subset questions were assessing the role of weight in initiating and sustaining smoking behaviour.
This study, however, found an interesting observation on eating behaviour as measured by the two food-related instruments in this population. The researchers had initially anticipated that the scores of both the NEEDNT and QSCRF questionnaires would rise over time, however, this was not observed. In fact, the opposite was seen whereby the scores reduced over time, although important to note that only the change between baseline and LATE follow up was statistically significant (P <0.05). The findings for QSCRF, which looked mainly at craving for sweet and savoury foods, nevertheless might explain the lack of support for substitution of one addiction for another in this study. Craving is a hallmark for addiction and is often reported to be significant if a diagnosis of addiction is to be made (Baker, Breslau, Covey, & Shiffman, 2012). It might, however, provide an alternative explanation for the low to absent diagnosis of food addiction. The lower NEEDNT scores was in keeping with the low craving for such food (sweet and savoury) which was reassuring but did not explain the weight gain observed overall in this population. One explanation was that other foods which were not recorded could also be high in calories and lack nutrition. The increase consumption of these food items overall together with the lack of any physical activity could also cause a weight imbalance and might explain the weight gain observed in this study. Future studies might need to take a detailed eating history which included exercise or energy expenditure history, though this record keeping must be balanced to avoid participant burden.

The qualitative study was able to support some of the anomalies found in the quantitative study on why weight gain might be a result of an increased in consumption in other types of food apart from those recorded by the NEEDNT which focused on energy dense but nutritionally deficient type food. Although the current study did not aim to intervene, it was possible that the frequent use of the NEEDNT, QSCRF and also the mYFAS instruments could have unintentionally change the behaviour of this population. Evidence included detailed reporting of foods during the SCeMES-QL interviews where participants appeared to be mindful of the NEEDNT foods when they responded as such; “I was really conscious of my chocolate bars and things like that”, “I've been particularly careful, knowing when to stop...it was good that the set of questions....for example, do you avoid going to somewhere where you know there was going to be pavlovas...”, which indicated that the participants might have taken the assessments tools as a form of treatment. Although these were essentially assumptions by the researchers, frequent mentions of such
experience in the qualitative study might indeed indicate to something more. Should this be true, using these questionnaires as a type of treatment might be a useful way to encourage weight control in a smoking cessation program as it is cheap and non-invasive. However, more studies need to be conducted to ensure the validity of this hypothesis.

12.3.4 The Interrelationship between Depression, Weight and Smoking Cessation Outcomes

Similar to other studies (Killen et al., 1996; Michele D. Levine et al., 2003), the SCeMES did not find any inter-relationship between depression, weight and smoking cessation. This is in contrast to the study by Adam M Leventhal et al. (2010) which found that tobacco smoking moderated depression and weight. Unlike, Leventhal et al. (2010), however, the SCeMES included the presence or absence of food addiction. Nevertheless no relationship was found between this food addiction, depression and quitting smoking. Though food addiction was included as a variable, the numbers were small with only two participants fulfilling the diagnosis at baseline. The low retention at both EARLY and LATE follow-up (< 50%), and limited successful quitters in both follow-ups might have also affected the outcome of this study. The current study might have been underpowered to detect changes. The study by Leventhal et al. (2010) in comparison had more than 50,000 samples in three national cohorts, therefore a bigger sample size might have found a difference in the SCeMES.

In the summary of Chapter 6, there was limited research in this area to the best of our knowledge. However unlike previous studies, this study included food addiction. Nevertheless, those with this diagnosis in the SCeMES were minimal with only two participants who met the criteria at baseline and no further increase was seen at follow-ups. Having a small number of successful quitters at the EARLY and LATE follow-ups might have also affected the analysis by not being able to detect changes between the analysed variables.

12.3.5 The Experiences of Smoking Cessation in the SCeMES

The qualitative study of this mixed method research was aimed to assist in providing additional insight into the quantitative variables of interest and also to explore the lived experience of the SCeMES smoking cessation program. The qualitative study was able to support the quantitative study beyond providing context to the study.
Unlike the expectations of the researcher, a quit attempt had a different meaning for the participants. Participants related a quit attempt to be a form of journey, whereas the researcher was understanding the quit attempt to be more like a destination with clear outcome expectations. For the participants in general based on the SCeMES-QL, they reported to feeling happy and successful with any improvement in their smoking reduction. This included a reduction in cigarettes smoked per day for example as opposed to abstinence from smoking. The latter, being the desired outcome for the researcher as a measure of success. Nevertheless, a recent study found that reduction of cigarettes precluded abstinence to smoking (Klemperer & Hughes, 2016) whilst others report that it might only predict future abstinence (Lindson-Hawley, Shinkins, West, Michie, & Aveyard, 2016). A review of 26 qualitative publications (Graham, Flemming, Fox, Heirs, & Sowden, 2014), indicate that cutting down might be a viable option, particularly in special populations (the study was on pregnant women), however requires more acceptance by healthcare providers considering that current understanding still recommends that total abstinence proffers the best result for health (Klemperer & Hughes, 2016; Lindson-Hawley et al., 2016).

This study found that for those who participated in the SCeMES, the smoking cessation experience could be explained to have three parts or domains. The first was related to the ‘outlook to quit smoking’ which was a theme related to the participants’ views on their quit attempt. A quit attempt which included suggestions of preparation, information, some level of accountability to self or others and a willingness to learn often led to a more pleasant quit smoking journey. Contrary, a quit attempt which was poorly planned or the attempt was ambivalent, the information on the attempt less clear, the quitting attempt was for others as opposed to self and where the attempter had a lack of self-esteem and a rigid plan led to an unpleasant quit smoking journey. Twyman et al. (2014) reported those who were more motivated have been found to be more successful in their quit attempts whereas those with low self-esteem appear to be less successful. Often, low self-esteem is a consequence of both previous failures to quit or as a result of poor quit smoking experience in the past, making the participant rebellious towards quitting smoking.

In the process of exploration through semi-structured interviews, the participants in the SCeMES-QL related additional information regarding their smoking cessation experience which was not initially anticipated. For the participants, the smoking
cessation program which they experienced consisted of three parts. The initial part described the participants’ views on their quit attempts, their ‘outlook to quit smoking’, whether it was their own expectation or a consequence of another person such as a loved one. It was found that for those who were more motivated to quit, able to understand what was expected of them and were willing to learn from this quit smoking experience, often reported a more pleasant quit smoking experience. Those who quit smoking for reasons other than themselves, reported ambivalence about their experience and expected that quitting smoking would be easy. This led to quitters in this category to have an unpleasant smoking cessation experience. The domain outlook to quit is linked to the ‘process to quit smoking’, the second domain. This domain is divided into two categories described as the particularities of quitting and the consequences of quitting. The latter is further divided into mood and weight concerns which were the main research questions, whereas, the former related to the smoking cessation provider, treatments available, follow-ups and outcomes. Previous studies have reported the particularities to quit as potential barriers to smoking cessation and more work needs to be done in this area to identify and subsequently address this issue. This study was in keeping with other studies in terms of provider-related complaints, particularly by general practitioners who were either too busy, inadequately trained in smoking cessation or were not emotionally present during consultation. The lack of training is not new and was reported as a factor for lack of support and adequate care (Ditchburn, 2012). Moreover, training is accessible and studies have found them to increase knowledge and competency (Abdul Kadir et al., 2013). The final domain in completing what participants in the SCeMES reported as a successful quit smoking journey was ‘support’. Support was divided into general and specific support. For the latter, specific type of support included support by specific groups of people such as the community, family, friends and also the healthcare provider assisting in the quit attempt. In their review, Twyman et al. (2014) reported one of three main barriers to quit smoking was support, and this was particularly seen in all major groups in their study. One of the limitations identified by Ditchburn (2012) was the lack of psychological support in smoking cessation. The authors argued that a clinic would be best in ensuring that this form of support and treatment was provided. In addition, the SCeMES found participants were keen to explore the use of group based treatment. A Cochrane review (Lindsay Stead & Lancaster, 2005) has also reported that it is at least equal to individual treatment, however there was insufficient evidence to say it was more cost effective. Participants were also keen to
partake in group based treatments compared to Quitline, possibly due to the perceived lack of support and engagement. A Canadian study on pregnant mothers (Nadia et al., 2016), found that blogging about quitting increases engagement and support and can be an addition to current group based support practice.

Both the fourth and fifth domain reported were unexpected and emerged from the data collected during the SCeMES-QL. Although not intentional, the quit attempts made by all participants in the SCeMES was across two major local issues happening in New Zealand and also Christchurch more specifically. The first issue was the national agenda for New Zealand to be smoke-free by 2025. This agenda became both a local and also a global commitment towards the Endgame model for tobacco control. New Zealand became the first country in the world to declare an end to tobacco smoking by the year 2025 where smoking prevalence was expected to be < 5%. The international community looked towards New Zealand for guidance and leadership in this area. As a result, during the course of the interviews, a domain termed ‘prejudice’ emerged to express the participant’s experience in quitting smoking in New Zealand during this time. This domain was divided into three categories which looked at the appraiser or those causing the feelings of discomfort, the response of the participants towards this prejudice and finally the repercussions, or how the participants responded or retaliated to the prejudicial activities felt. This feeling of being judged or even stigmatize had been reported in the past in Christchurch amongst the lower socioeconomically deprived group in the low income Christchurch suburb Aranui by Thompson, Pearce, and Barnett (2007), however, the current experience was more generalized to all groups studied as a result of the nationwide call to be smoke-free. Notwithstanding, these same feelings are not uncommon. Other studies exploring the role of increasing tobacco control policies found the same sentiments being expressed by smokers in both the UK during their clean air policy as well as in Canada (Bell et al., 2010; Louka et al., 2006). Canada had early on in their legislation towards smoking adopted tough tobacco control measures which made some smokers feel marginalized (Bell et al., 2010). In a recent review, Evans-Polce, Castaldelli-Maia, Schomerus, and Evans-Lacko (2016) concluded that it was important that tobacco control advocates take into account the possible role of stigma as it can derail the intention of available policies through resistance and rebellion by smokers already feeling pushed by current policies which were meant to assist them.
The second local issue which was closer to the population studied was the Christchurch earthquakes which started in September 2010 and continued over the next three years with significant after-shocks in February, June and December 2011 and persistent smaller after-shocks till late 2013. To the best of our knowledge, this was probably the only mixed method research study on smoking cessation conducted throughout a period of devastating earthquakes. There were two major timelines in which the participants often referred to, these were during and after the February 2011 earthquakes. Many participants reported reinstating their smoking during this period as a result of stress towards the consequences of the earthquake. This was supported by a study conducted in December of the same year which indicated both initiation and reinstatement of smoking happened as a result of the earthquakes (Erskine, Daley, Stevenson, Rhodes, & Beckert, 2013). The closest experience of a similar life event was reported by Forman-Hoffman, Riley, and Pici (2005), whereby the authors investigated relapse to smoking as a result of the September 11, 2001 terrorist attacks of participants from Washington DC. The participants were then involved in a clinical trial examining the effectiveness of a nicotine inhaler. These authors found no statistically significant change in smoking or relapse rates compared to rates prior to the event in the study. For the SCeMES, the post-earthquake experience was more important. Studies that were related to natural disasters or a life-event often looked at a single event, which was different from what the participants in SCeMES-QL related. This repetitive stress due to repetitive aftershocks was also noted by G. A. Wilson (2013) in his study. Participants in the SCeMES-QL reported an experience which was termed as ‘earthquake fatigue’. This terminology attempted to express their general feeling and their feeling of exhaustion towards the various difficulties which arose as a result of on-going destruction on public and personal infrastructure from the aftershocks. This destruction left a sensation of perpetual stress to the participants involved. Despite this, the participants shared their experience of hope and optimism termed as a ‘new look to life’ and some, even cited this, as a reason behind why they continued to participate in the SCeMES even though the environment was not conducive for them to continue.
12.4 Limitations and Strengths

12.4.1 Limitations

One of the main limiting factors was the retention rate of participants for this study. At 3 months, the default rate was estimated to be 51.6% and at 12 months this increased to 63.3%. Other studies have reported default rates of between 20 – 50% (Backinger et al., 2008; Ferguson, Bauld, Chesterman, & Judge, 2005; Lee et al., 2013; Wee, Shahab, Bulgiba, & West, 2011) in their smoking cessation programs within community samples and lesser within clinical trials for smoking cessation (Gilbody et al., 2015). This study was a prospective cohort conducted during a difficult period in New Zealand’s history. Every effort was made to increase retention at both follow-up periods, particularly the later follow-ups including phone call reminders for both follow-ups, flexible consultation hours including after hour access, a token transportation reimbursement, and data collection through the telephone for participants who could not attend the final follow-up at the one year period, however, the retention was still reported < 50% at 3 months and 1 year. The qualitative study provided further information regarding what might have transpired during the period to explain this low retention rate. Those who attended EARLY follow-up were seen just prior to the February 2011 earthquake and recruited across the June 2011 earthquakes which affected Christchurch. This was the period with the most destruction towards both private and public infrastructure. Moving around Christchurch in general was extremely challenging. In exploring the participants’ experiences in quitting smoking through the SCeMES, the participants reported these difficulties when relating to the period of the earthquakes. The primary researcher was similarly affected by the Christchurch earthquakes. For the period of nearly three months after the February earthquake, the National Addiction Centre was not operational and follow-up visits were a challenge due to logistic reasons. Later in the course of the study, public and private repairs made follow-up visits unappealing as it was difficult to move within the area where the National Addiction Centre was located and individual participants had also reported their own personal situational concerns such as awaiting insurance reviews, a lack of transport and support during the period. This was on top of permanent displacement for some and relocation to other parts of Christchurch and New Zealand by others. It was reported that over the 12-month period post-earthquake, 70 000 people had moved within Christchurch or elsewhere, causing both patient tracing and contact tracing difficult (Love, 2011).
These experiences understandably made retaining participants difficult in the SCeMES.

The second notable limitation was the reduced abstinence rate at both early and late follow-up. Accordingly, the abstinence rate for the SCeMES was 14.5% and 14.8% respectively, at three months and at one year which were in the lower end of most treatment studies for smoking (Ferguson et al., 2005; Walker et al., 2011; Wee, West, et al., 2011). More recent studies have reported better abstinence in those using smoking cessation aid compared to those without. This study however was not focused on abstinence other than to compare between those with depression and weight gain compared to those without. A study by Erskine et al. (2013) supports the difficulty in quitting smoking during the period of the SCeMES. In their study conducted just after the December 2011 earthquake, it was reported that nearly 58.1% of ex-smokers had started smoking again as a result of the Christchurch earthquake. More importantly, 27% of those surveyed were non-smokers prior to the earthquakes but had started the addiction post-earthquake. The SCeMES-QL reported participants experiencing the same where comments such as; “I don’t think you could give up smoking when you’re also dealing with a very traumatic thing”; “bugger this, if this is what life is going to be like then who knows what’s going to happen tomorrow, I’m going to smoke!” were often reported during the interviews. Erskine et al. (2013), also found this to be true as nearly all the participants surveyed reported stress as a major precipitant towards their smoking. Non abstinence therefore can lead to default as a result of guilt which had been reported in other studies (Twyman et al., 2014) which might explain further the higher default rate above. Possible mood and weight changes, which were undetected in those who defaulted might have further precipitated non abstinence and study attrition (Leeman et al., 2006). It is important to take note of these reasons as participants who continue attending follow-ups might be different compared to those who did not and therefore may affect the study’s conclusions (Borrelli et al., 2002).

A third limitation was the study design which was a prospective cohort without a control group. This study therefore was unable to measure effectiveness of treatment between those with smoking cessation aid compared to those without. However, the objectives of the study were not to measure treatment effectiveness but was more to investigate depression and weight variables within the cohort. Therefore, a control although useful was not required for this objective. Moreover, this study wanted to
also explore the lived experience of participants quitting their smoking and therefore
a mixed method design incorporating both quantitative and qualitative study was
more appropriate to answer the research question provided.

A fourth limitation was the small sample size for the SCeMES-QL of 25 participants.
Qualitative samples often are recruited purposively which is one explanation for the
limited number of recruits, however, in qualitative research what is more important is
data saturation whereby further interviews did not provide additional information than
what is already known which had happened in the SCeMES-QL. Therefore, although
the sample size is small, relevant information was obtained adequately to provide
relevancy to the results.

12.4.2 Strengths

This was one of very few mixed method research studies investigating the role of
depression, weight and smoking cessation whilst exploring the ‘lived experience’ of
smokers quitting in smoking cessation program. The use of mixed method research
as a study design allowed the investigation of quantitative variables and at the same
time explore the possible qualitative explanations for the findings. Also the qualitative
study allowed more understanding on the experiences of quitting smoking which will
improve further current existing understanding in this matter.

This study was also one of few studies in the country which investigated clinical
depression using a validated instrument for current depression. Prior studies have
either used a Māori worldview instrument or a single item within an on-going study.
This study improved on these limitations by capturing those with depression using
both the HADSD and also the BDI-II instruments to diagnose depression.

This study was one of very few studies which attempted to investigate the role of
food addiction as a cause of weight gain. Research in food addiction is growing at an
exponential rate, however, there is not as much work investigating food addiction and
more so, food addiction as a cause of weight during smoking cessation. Although this
study had a negative finding, it augurs well for the research community within New
Zealand and beyond to investigate further the potential role of switching of addictions
with a larger sample size and better instruments among others.

The qualitative study complements the quantitative study for the SCeMES. More
importantly, this study was able to capture the experience of quitting qualitatively
during the two periods of interest in Christchurch and New Zealand namely the Christchurch earthquakes and also Māori Affairs Select Committee report for a smoke free New Zealand. The use of a qualitative study allowed exploration even further than the topic at hand as had happened in the SCeMES. Although both were not primary objectives for the qualitative study, it was included as the signal for it was too hard to ignore during the interviews. As with qualitative data collection which is iterative, this opportunity was possible in keeping with the philosophy of the naïve inquirer. Therefore, there was a greater opportunity for learning from both events during the course of the study.

12.4.3 Future Research

The results of the two studies in this thesis further contributed to the understanding on smoking cessation. More importantly, the two studies complement each other and therefore allowed for better understanding on the findings of both types of study. An issue for this study was retention, which was lower than expected. Similarly, lower retention at the end of follow-ups might affect the detection of a positive predictor for both mood and eating variables, both of which were not found in this study to be predictors for smoking cessation.

Chapter 2 described in length the various types of factors which might be predictive for smoking cessation. Unfortunately, this study was not able to include the many associating factors and its relationship with smoking cessation. Therefore, it is recommended that future research try to include as many of these factors as possible. As the SCeMES recruited participants from the ZAP study, there was strong concern for respondent burden. This study required assessments to take up to one hour in total at the beginning and the baseline was often done during office hours. Subsequent follow-ups were shorter but they can still take up to 30 minutes. Therefore, a balance is needed to ensure that participants were not put off by the duration of the assessment and the questions asked.

This study found for participants who had completed follow-up irrespective of smoking status gained weight. Participants who were abstinent gained more weight compared to those who continued to smoke, though the reason remains unclear in this study. The qualitative findings pointed towards general increase in food consumption, rather than specific food choices leading to weight gain. Future studies attempting to investigate this might need to conduct more comprehensive monitoring
of food, for example, monitoring not only the type of food but possibly frequency and amount too. The monitoring of energy input needs to be balanced with the monitoring of energy expenditure.

Contrary to prior expectations, this study hardly found anyone with a diagnosis of food addiction. There was also no further change over time for participants to develop this condition. Before any conclusion are made, these findings would need to be replicated, preferably in a larger population with a lower mean age i.e. younger group since addiction often starts during the adolescent period. Therefore having an older population could lead to missing cases. Furthermore, it is recommended that future studies include smokers who were quitting for the first time. The SCeMES participants reported an average of four quit attempts and it was not known how the participants coped with their withdrawals during their quit attempts. It is possible that the participants had learnt coping mechanisms to reduce their withdrawal to nicotine. An example could be stress, and the role of eating to alleviate this stress as a coping mechanism. Using a population quitting in only their first or second attempt might have the potential to remove this confounding factor.

This study had a qualitative component which found that participants related their quit attempts more as a journey rather than as a destination. At present smoking cessation studies used the 7-day point prevalence of not even a puff over seven days to determine abstinence. Future studies might want to look into retention in the program or repeated attempts to quit smoking after relapse to determine the outcomes because they better reflected the idea of supporting quit attempts rather than focusing on treatment success as an outcome.

Future qualitative studies might want to consider replicating the SCeMES-QL as this study was unique given the influence of not only an unprecedented life event which was the earthquake, but also that it was conducted during a period of rapid and evolving implementation of tobacco control measures nationally. It is possible that some of the qualitative findings which represented these environmental factors might make transferability of knowledge more difficult between societies.

Consideration of future research directions has highlighted the need for replication of the current findings with increased sample sizes to investigate the role of mood specifically depression and eating especially weight in relationship to smoking cessation. Continued work needs to also be done in investigating the inter-
relationship between the three variables considering that this and other previous studies had been inconclusive. The negative findings reported need to be considered in light of the limitations reported, although a number of positive findings may be able to assist in current and future policies. This area of research is still evolving and further research is warranted.

12.4.4 Implications for Practice

There are a number of suggested implications for practice which this study can contribute in the area of smoking cessation. This study found that depression rates for both lifetime and current in smokers was similar to those reported elsewhere. More importantly this study also found that over time, there was no worsening of their depression for those who have had a previous history or those which were found to have active symptoms in the study. Therefore, this study provides continued reassurance that smoking cessation does not worsen the depression of individuals who are affected by this medical condition. Furthermore, this study encourages practitioners to continue treating all smokers irrespective of their mental health status which will in turn improve the health of those with mental illness.

The second implication for practice is the use of the NEEDNT questionnaire as a clinical tool. As was found, it appears that although this questionnaire was meant to be used as an evaluation questionnaire for certain food items, the participants in this study had used this instrument as a form of treatment. As a result there was evidence that, particularly in the qualitative study, eating habits and behaviours had changed as a result of repeated exposure to the NEEDNT. Considering this tool was easy to administer and did not take too much time to use, in future clinical practice it could possibly be used to start the discussion about healthy eating which will assist in weight management for smokers who plan to quit. This was important as this study found that smoking cessation did indeed increase weight compared to continued smoking.

The third implication for practice from this study was the role of food addiction which was not seen as a consequence of quitting smoking and reason for weight gain. However, as discussed, further studies using larger samples are more likely need to fully appreciate the role of sweet and rick foods as a cause for weight gain in those susceptible, however at this point of time, there is limited evidence to suggest that food addiction is the cause of weight gain post quitting.
12.5 Conclusion

This study was aimed at investigating the association between depression, weight and smoking cessation using a mixed method research approach. This study was also interested in exploring the ‘lived experiences’ of the participants who attended this smoking cessation program in Christchurch.

This study found a lifetime prevalence of depression amongst current smokers was similar to studies reported elsewhere. In general it was double compared to the general population studied. Current depression on the other hand was in the lower range of what other studies had found. The diagnostic instruments used also played a part in these results. Nevertheless, both results provided the much needed baseline information using standard diagnostic tools which were not reported before in New Zealand to the best of our knowledge in smoking cessation research.

This study, however, was unable to find any association between depression and smoking cessation outcomes as was initially expected. It is possible that this was affected by the lower than expected retention rate at both follow-up periods and also a lower than expected successful abstinence from smoking at the same follow-up periods. The SCeMES qualitative study suggested that the low retention and abstinence might be the result of the stress reported as a result of the earthquakes which had happened during the study period. Without a control group, however, this could only be speculated. Nonetheless, it appeared that environmental factors which were described as ‘unprecedented’ might have affected the outcome. It would be of interest to replicate this study with attention towards these issues, though, it would be impossible to predict such an event ever happening again during a similar smoking cessation study.

This study found weight gain was an issue for all participants who attempted to quit smoking. Participants who were abstinent gained more weight compared to those who were still smoking at the same time period at follow-up. This finding was reassuring as it was similar to the current literature. This study however found no association between eating variables which included weight and smoking cessation. This study, however, went a step further and postulated if weight gained on quitting smoking was the result of switching of addictions from nicotine to food. This hypothesis, however, was not substantiated in this study. There was hardly any participants diagnosed at baseline with food addiction and there was no increase
over time. The qualitative results did reveal that the appetites of nearly all participants interviewed increased although this was not captured using the NEEDNT questionnaire in the quantitative study. It was possible that the weight gained was the result of a general increase in consumption with a lack of energy expenditure and therefore caused weight gain in this population. This was further supported by reduction in the QCSRF and the NEEDNT which were correlated. Both questionnaires measured craving for sweet and savoury foods and consumption of energy heavy but nutritionally deficient foods. A reduction meant that energy intake was from other sources which were not explained in this study.

When all three variables were investigated together, this study did not find any relationship between the three variables of interest. Other studies reported elsewhere did not find any relationship between the three variables of interest either. Nevertheless, this study was unique with the inclusion of food addiction which was never reported before. It was possible though that the small number of those diagnosed with food addiction and the final sample size might have affected the final analysis and thus, future studies would need to ensure this was addressed.

This study was also interested in exploring the lived experience of the participants quitting in a smoking cessation program which was observational in nature. Two major findings were reported: the experience of quitting smoking, and the role that the environment played towards this experience. This qualitative study found that participants were more interested in the experience of quitting rather than the outcome of either success or failure to stop smoking. A more positive experience might result in a successful quit attempt, retention in the study and a further attempt to quit if they had relapsed during the program period. A negative experience was often reported with the opposite results. For those attempting to quit through the SCeMES, these experiences were influenced by the environment at the time when the Christchurch earthquakes occurred, as well as the implementation of increasingly restrictive tobacco control policies as the nation moved towards Smokefree 2025. Therefore, although the participants reported their quit attempt as a ‘journey’, this journey might not be transferable to another population with a different environment. As reported earlier, future studies would need to replicate this study in different smoking cessation programs.
References


Bell, K., McCullough, L., Salmon, A., & Bell, J. (2010). ‘Every space is claimed’: smokers’ experiences of tobacco denormalisation. *Sociology of Health & Illness, 32*(6), 914-929. doi:10.1111/j.1467-9566.2010.01251.x


Eder, B. (2013). Development and Reliability of a Short Food Frequency Questionnaire to Assess Intake of Non-Essential Energy-Dense Nutritionally-Deficient (NEEDNT) Food Items. (Dietetics Masters), University of Otago, Dunedin.


Fagerström, K. (2012). Determinants of tobacco use and renaming the FTND to the Fagerstrom Test for Cigarette Dependence. *Nicotine & Tobacco Research, 14*(1), 75-78.


Hall, W., Madden, P., & Lynskey, M. (2002). The genetics of tobacco use: methods, findings and policy implications. Tobacco Control, 11(2), 119-124. doi:10.1136/tc.11.2.119


considerations and preliminary results. *General Hospital Psychiatry, 4*(1), 33-47.


MacDougall, C., & Fudge, E. (2001). Planning and recruiting the sample for focus groups and in-depth interviews. *Qualitative Health Research, 11*(1), 117-126.


O'Reilly, M., & Parker, N. (2013). ‘Unsatisfactory Saturation’: a critical exploration of the notion of saturated sample sizes in qualitative research. Qualitative Research, 13(2), 190-197.


Siahpush, M., Yong, H. H., Borland, R., Reid, J. L., & Hammond, D. (2009). Smokers with financial stress are more likely to want to quit but less likely to try or succeed: findings from the International Tobacco Control (ITC) Four Country Survey. Addiction, 104(8), 1382-1390. doi:10.1111/j.1360-0443.2009.02599.x


Staten, R. R., & Ridner, S. L. (2007). College student's perspective on smoking cessation: "If the message doesn't speak to me, i don't hear it". *Issues in Mental Health Nursing, 28*(1), 101-115.


psychiatric disorders: National Institute of Mental Health report. *Nicotine & Tobacco Research, 10*(12), 1691-1715.


Appendix A - Publications and Presentations

Amer Siddiq Amer Nordin, J D Sellman, S Adamson. The role of psychiatrists in tobacco dependence treatment. Asean Journal of Psychiatry, Volume 16, January to June 2015, issue No.1

The Role Of Psychiatrists In Tobacco Dependence Treatment
ASEAN Journal of Psychiatry, Vol. 16 (1), January - June 2015: 5-17

REVIEW ARTICLE

THE ROLE OF PSYCHIATRISTS IN TOBACCO DEPENDENCE TREATMENT

Amer Siddiq Amer Nordin**, John Douglas Sellman*, Simon Justin Adamson*

*National Addiction Centre, University of Otago, Christchurch, New Zealand;
**University Malaya Centre of Addiction Sciences, University Malaya, Malaysia.

Abstract

Objective: Global tobacco control efforts in both prevention and treatment have advanced to levels never imagined 20 years ago. This review examines the relationship between mental illness and tobacco use, with particular focus on the role of psychiatrists in the treatment of tobacco dependence. Methods: The literature search utilised MEDLINE, Embase and PsychINFO databases using the terms psychiatry, psychiatrist, smoking cessation, tobacco use disorder and tobacco dependence treatment. A manual search of all references from relevant scientific articles obtained was also conducted. Finally, further material sourced included all major guidelines for smoking cessation or tobacco dependence treatment from the United States, United Kingdom, Canada, Australia and New Zealand. Results: Psychiatry has ignored tobacco dependence and its treatment resulting in multiple missed opportunities in improving the health and well-being of smokers with mental illness. Improvement in the training and knowledge of psychiatrists and those in the mental health sector will be the most effective activity to rectify this situation. Conclusion: Psychiatry must recognise tobacco dependence as equally important as the primary mental illness and to treat accordingly. A significant change in the training of future psychiatrists, introducing or implementing smoke free mental health services, changes in the management of caring for the mentally ill, and the introduction of tobacco treatment specialists within the mental health system is needed if psychiatry is serious about confronting this problem. ASEAN Journal of Psychiatry, Vol. 16 (1): January – June 2015: 5-17.

Keywords: Tobacco Dependence Treatment, Smoking Cessation, Smoking, Addiction, Psychiatry

Introduction

Global tobacco control efforts in both prevention and treatment have advanced to levels never imagined 20 years ago [1]. Despite this, smoking is still the number one public health problem worldwide. Cigarette smoking is the preferred method of ingesting tobacco and causes the most harm. Cigarette smoke contains 7000 toxins and a substantial number of these are proven to be carcinogenic [2]. Smoking not only affects smokers individually but also those around them. Second-hand smoking (SHS), or environmental tobacco smoke (ETS), a class 1A carcinogen, has been scientifically shown to be detrimental to health [3, 4]. An estimated six million lives are lost prematurely each year as a result of smoking and will increase by another four million as early as 2050 if the status quo [2].

In response to this threat to human health, the World Health Organization (WHO) established a treaty known as the Framework Convention for Tobacco Control (FCTC), which came into force in February 2005 [5]. There are now 176 nations that have ratified
The Role Of Psychiatrists In Tobacco Dependence Treatment
ASEAN Journal of Psychiatry, Vol. 16 (1), January - June 2015: 5-17

this treaty, and the number is growing. The main aim was to assist member countries in their public health efforts against tobacco use, particularly in smoking. The treaty also provided new dimensions in legal health cooperation worldwide on tobacco control in response to various efforts by the tobacco industry to protect its interest using legal means [5,6]. Within the Asia Pacific region, Australia and New Zealand are at the forefront of this initiative, with the recent launch of plain packaging for all cigarette sales in Australia [7], and New Zealand’s declaration to be a smoke free nation by 2025 [8]. Through its commitment to be smoke free by 2025, New Zealand will use all initiatives available to reach this goal. Both of these initiatives are being closely observed by other FCTC member countries including those in Southeast Asia.

Advances in public health measures have brought about reductions in the prevalence of tobacco use and dependence. The effect of this has been an increasingly ‘hard to treat’ group of addicted patients at a clinical level [9]. Psychiatrists could be argued to be the ideal practitioners to treat tobacco dependence when there is greater clinical complexity due to their training in the interaction between physical, psychological and pharmacological factors impacting on addiction and tobacco use together with social contextual issues [4,10]. They are also skilled in many forms of psychological interventions such as cognitive-behavioural therapy, motivational interviewing and relapse prevention along with prescribing pharmaceuticals [4]. Sellman [11] had previously called for psychiatry to “embrace nicotine dependence as the leading mental disorder of our age” noting that advancements in both the science of nicotine addiction and ways to manage it are rapidly advancing.

This review examines the relationship between mental illness and tobacco use and the role of psychiatrists in the tobacco dependence treatment. Finally, possible solutions are offered in order to advance the role of psychiatrists in the treatment of tobacco dependence.

Methods

A literature review was conducted in July 2012 using the MEDLINE (From 1946 till current), EMBASE and PsycINFO online database. Search terms included psychiatry, psychiatrist, smoking cessation, tobacco use disorder and tobacco dependence treatment. Searches were limited to humans and English publications. Articles that were related to surveys on psychiatrists and their involvement with smoking cessation or tobacco control were kept for in-depth review. A second search through the references of these publications was conducted to identify publications that were missed using the databases mentioned. Publications were excluded if they did not include information on these topics.

The initial literature search identified 515 journal articles. A single author (A.S) read the abstracts of these articles. A total of 486 articles were excluded as they were not pertaining to psychiatrists and smoking cessation resulting in 29 articles that were retrieved for in-depth review. A further 18 were excluded as they were not surveys, therefore 11 were kept. Further search through these articles recovered two articles that were not included in the first search for a total of 13 published articles surveying psychiatrists and their role in smoking cessation. A manual search of all references from relevant scientific articles obtained was also conducted. Finally, further material sourced included all major guidelines for smoking cessation or tobacco dependence treatment from the United States, United Kingdom, Canada, Australia and New Zealand.

Mental Illness and Tobacco Use

Individuals with mental illness are more likely to be current smokers compared to the general public as a whole. On average, two to three times as many people with mental illness smoke [12-14]. Conditions such as schizophrenia are associated with smoking prevalence of up to 85% [13, 15]. Those with schizophrenia also smoke more (defined as smoking more than 25 cigarettes per day) [16, 17], have higher dependence or severity scores compared to the general public [18], and have been found to be more “efficient smokers” [19], absorbing more nicotine with each puff. People with mental illness constitute 16% of the New Zealand population [20] but smoke
33% of cigarettes consumed [21]. Similarly, in the United States where 25% of the population has mental illness [11], Lasser [17] found that nearly 44% of all cigarettes sold were consumed by those with mental illness, with Grant et al. [23], reporting 57.6%.

Although smoking is highly prevalent and the consequences debilitating, those with mental illness and nicotine dependence are generally neglected in psychiatry [24, 25]. It is common for them to be excluded from smoking cessation trials or not included in quit smoking initiatives altogether [26, 27]. Some professionals have referred to this group as the “underserved” population [28], and together with other groups, such as the low-socioeconomic population, often have high prevalence and more difficulties in quitting smoking.

The connection between mental illness and tobacco use is still not fully understood [13, 16]. A complex interplay between biological, psychological and social factors has been suggested [13], which is likely to vary according to specific mental illness under question.

In schizophrenia for example, the involvement of the alpha-7 nicotinic receptor may be faulty [13]. Geneticists have found a link between this receptor and chromosome 15 which is believed to be linked with nicotine addiction [29]. The α-7 nicotinic receptor is involved with a physiological response to repeated auditory stimuli and also cognition in particular at the visuo-spatial working memory [13]. Abnormalities in both areas are linked to increased smoking as nicotine has been found to assist in minimising the side-effects from these abnormalities [31]. Psychosocial factors such as poverty, unemployment, lower levels of education and difficulties in accessing health services, often found in those with schizophrenia, are also important [13]. On the other hand, in anxiety disorders for example, especially post-traumatic stress disorder (PTSD), the hypothalamic-pituitary-adrenal (HPA) axis may be at fault. Impairment in the HPA axis may lead to the development of nicotine tolerance [13]. Alterations in this system can cause cortisol interference/involvement which increases the risk of smoking in those with PTSD by enhancing both tolerance and sensitization to various effects of nicotine. Other factors that may lead to increase smoking within this group are psychological factors such as “anxiety sensitivity” and negative affect which can act as cues to initiation or continued smoking [13]. A low threshold for distressing situations and deficits in cognitive-emotional processing may also play a role in the relationship between smoking and anxiety disorders.

Unlike schizophrenia and anxiety disorders where the association appears to be unidirectional, the association for depression is thought to be bidirectional [13, 32]. Some studies report a moderating role of dopaminergic genes and depressive symptoms in determining both adolescent and adult smoking practices [13]. Others, however, suggest psychosocial stresses associated with depression make the individual highly sensitive to the reinforcing effects of smoking, and/or increase the vulnerability of the individual to social smoking influences [13]. The relationship between biological and psychosocial factors in determining smoking and mental illness is clearly a complex one.

**Psychiatry and Tobacco Use**

Tobacco use and its treatment have been underemphasised in psychiatry. One example is the establishment of smoke-free inpatient services. Despite many countries having environmental or similar laws to prevent smoking in closed buildings such as hospitals [1], not all inpatient psychiatric facilities are smoke-free [30]. In Christchurch, New Zealand, it has taken half a decade longer for all mental health services to be smoke free, achieving this in 2010 [31] compared to all public hospitals in New Zealand which have been smoke free since December 2004 [32].

**Benefits of Tobacco Dependence Treatment**

The benefits in treating tobacco dependence are significant for those with or without mental illness. Treating tobacco dependence improves the lives of both the smoker and those around them. Smoking causes many health problems such as lung and cardiovascular diseases but these conditions on quitting are reversible to a degree [33]. Studies have found that those who
The Role Of Psychiatrists In Tobacco Dependence Treatment
ASEAN Journal of Psychiatry, Vol. 16 (1), January - June 2015: 5-17

quit experience early benefits of improved respiratory and cardiovascular functions [34]. More chronic conditions, such as cancer, are lowered as early as five years post abstinence [35]. Quitting smoking not only reduces the risk for medical health co-morbidities but has also been found to reduce the risk of developing substance abuse [27]. It may also increase the likelihood of stopping other existing substance abuse problems [27].

Tobacco use has also been shown to affect psychiatric treatments. Antipsychotic medication for schizophrenia, such as olanzapine and clozapine as well as certain antidepressants such as fluvoxamine are broken down by the cytochrome P450 enzyme system in the liver [36, 37]. These enzymes are affected by the hydrocarbons in cigarette smoke. Smoking increases the breakdown of these medications leading to reduced serum drug concentration. Those requiring these treatments will therefore need higher dosing which is not only potentially dangerous and can lead to other health complications like metabolic syndrome but is also expensive to the health system [36]. Similarly, on quitting smoking, these same levels may be elevated and will need to be carefully reassessed.

Treating tobacco dependence unfortunately is not generally undertaken as part of normal clinical practice by psychiatrists despite being one of the most cost effective interventions available at a population level [37]. Tennesen [38], after reviewing several meta-analyses, found that treating those with tobacco dependence was much more cost effective compared to other public health interventions such as mammograms or providing treatments for elevated serum cholesterol levels. He reported the cost of adjusted quality of life years (QALY) to be between $550-2200 (adjusted USD). Cromwell et al. [39] found the cost of adjusted QALY to be between US$1108-4542 and also the more intensive the intervention the more cost effective it was. It is now recognised that current efforts to reduce the national prevalence further are limited by those with severe nicotine addiction who are generally more difficult to treat and less likely to respond to available treatments [9]. Many individuals with mental illness who smoke fit this description, and their widespread treatment by psychiatrists and other mental health clinicians are likely to assist at a population level in reducing national smoking prevalence rates further.

Barriers and Solutions

There have been a number of barriers identified as to why psychiatrists are hesitant to conduct tobacco dependence treatment. Among these barriers is the failure to inculcate interest to conduct smoking cessation among psychiatrists at the outset of their training, the lack of interested supporting staff, and/or unavailability of appropriate infrastructure.

Prochaska [40] commented that one of the main reasons that tobacco control has been delayed this long in psychiatry can be attributed to the “self-medication hypothesis”. This hypothesis states that individuals with mental illness “self-medicate” with tobacco smoking to reduce or remove distressing symptoms that they may have experienced from their mental illness. For example, in schizophrenia, abnormalities in α7-nicotinic receptor have been linked to the presence of auditory hallucinations through the P50 gating response [13]. Tobacco smoking affects the P50 gating response and therefore may assist by reducing these symptoms. Similarly for depression, patients may smoke as a result of the effect of tobacco smoking on monoamine oxidase inhibitors responsible for the breakdown of the neurotransmitters dopamine and serotonin [36]. Smoking, therefore, may elevate mood by acting like antidepressants. Side-effects such as akathisia, caused by conventional antipsychotic use, in the treatment of schizophrenia, are also thought to be reduced by tobacco smoking [41]. These findings, however, were not missed by the tobacco industry. In another study Prochaska, Hall and Bero [15] found that the tobacco industry had acted upon this knowledge by slowing down efforts to treat smokers with schizophrenia through promoting self-medication as one of the strategies used to market cigarettes to patients with schizophrenia.

Another major barrier in tobacco dependence treatment in psychiatry is the delay in implementing smoke free services in mental health. Questions are still being asked if this move is necessary in certain parts of the world.
The Role Of Psychiatrists In Tobacco Dependence Treatment
ASEAN Journal of Psychiatry, Vol. 16 (1), January - June 2015: 5-17

[30]. At times, it is the service provider themselves that are not keen for the implementation of smoke-free services [42-44]. Among the reasons cited are that patients will relapse if asked to quit or will react aggressively, they are not motivated to quit as it is not their priority and smoking is used both as a ‘reward’ for positive behaviour and a ‘tool’ for engagement between mental health staff and patients [40, 45].

The high rate of smoking amongst mental health staff is also a barrier for treatment provision. Many studies have shown that staff working in mental health services often report higher smoking prevalence compared to their peers [44, 46]. Those who smoke have been shown to be least likely to assist smokers to quit or acknowledge that smoking is a problem for the patient in their care [46]. A study by Morris, Waxmonsky, May, & Giese [47] using a qualitative approach found that patients reported difficulty in attempting to quit when those treating them also smoked.

A series analysis of publications which primarily surveyed psychiatrists on various aspects of tobacco dependence treatment, revealed a number of psychiatrist specific barriers. Lubman, Jorm, & Morgan [48] surveyed 2000 general practitioners and 1710 psychiatrists on their belief regarding appropriate interventions for mental disorder in youth using a clinical vignette and found that compared to general practitioners, psychiatrists in the study endorsed less belief in the helpfulness of reducing smoking for young people with either psychosis or depression. However, the study had a low response rate (24% for general practitioners and 35% for psychiatrists). Another survey [49] of 80 psychiatrists working in a community mental health centre found that 20% did not even consider enquiring about their patients’ smoking status. Ratschen, et al. [44], found that among workers in an inpatient unit in the United Kingdom, where the majority were psychiatrists (junior and consultants), there was a lack of knowledge in tobacco dependence, its treatment and relationship with mental illness. This lack of knowledge could be based on misconceptions that psychiatrists might not believe their efforts would lead to any success [49], or that smoking cessation was not as important as treating the primary mental illness [49, 50].

A survey of 105 trainee psychiatrists in all years of training in the United States found more than three quarters reported their ability to assist smokers to be fair to poor [51]. They also reported no, or inadequate, training in tobacco dependence treatment in both medical undergraduate and postgraduate training. On a scale of 1 to 5 for confidence, the average rating was 3. In this sample, a third reported either being current or ex-smokers. In another survey of 114 psychiatry residency training directors [52], only half reported their centres provided training and that the median time spent was an hour. A follow-up post implementation training survey indicated an increase in both knowledge and skill and a subsequent increase in confidence in treating nicotine dependent people [53]. Implementation was found to be of minimal cost and all respondents would recommend the training to their peers [53]. A recently conducted literature review on MEDLINE up to 31 July 2013 did not reveal any new studies on training of tobacco control and dependence treatment in postgraduate psychiatry training, despite previous concerns that trainees had a lack of knowledge and skills in assisting smokers to quit. A survey of 74 psychiatrists, chairs of US academic psychiatry, found that although just under two thirds agreed that stopping cigarette smoking was “very” important and more than two thirds supported tobacco dependence treatment programs, less than half of them had such programs in their respective institutions [54]. Continuous medical education (CME) on tobacco dependence and mental illness was also found to be lacking and often reported as one of the main reasons for the lack of knowledge and treatment [44,49,55,56].

Most treatment guidelines recommend the 5 A’s (ask, advise, assess, assist, arrange), as their main approach to managing tobacco dependence [57-59]. New Zealand, however, uses a modified ABC (ask, brief advice, cessation support) in its guidelines [60]. A consequence of the lack of training was the unfamiliarity with guidelines, treatment and services available to refer to. Using the National Ambulatory Care Survey which was conducted in the 1990s, Himelhoch & Daumit
[61] found that only 12.4% of patients with mental illness were offered tobacco dependence treatment. None were given a diagnosis of nicotine addiction and none were prescribed nicotine replacement therapy (NRT) or any other pharmacological intervention. Three other studies also found similar findings in prescribing practices of NRT by psychiatrists (9.7% [62], 10% [49] and 37% [56]). Another study by Price et al. [55], involving child and adolescent psychiatrists, found that NRT was not the standard care in their practice. An audit survey on diagnosis of nicotine dependence for three years in a youth specialty service where psychiatrists practiced revealed only a 3.6% written diagnosis in the first year of audit. This number jumped to 26.3% two years later, understood most likely to be the result of discussion regarding the low number and interest in the field [63].

Nicotine dependence has already been recognised as a medical condition in both the International Classification of Disease (ICD) and the Diagnostic Statistical Manual of Mental Illness (DSM) [64,65]. However, due to the lack of awareness as highlighted, the condition is seldom documented [63, 66]. Without diagnosis documentation, the importance in treating the tobacco dependence may be lost [62]. Opportunity to provide treatment and the possibility for reimbursement was reduced. It is of interest to note that other studies [46,50,61,67], reported that surveys on other specialities such as primary care and even medical colleagues reveal they were detecting and treating patients with mental illness who want to quit more often than psychiatrists.

Apart from providing direct treatment, referral is also one of the strategies to assist smokers to quit [57,60]. Psychiatrists like other physicians, have time constraints and one method of assisting patients to quit smoking is to refer them to tobacco dependence treatment services within the community they are working in. However, Steinberg, et al.[50] who surveyed 5726 physicians in the New Jersey area found that psychiatrists were least likely to be familiar with existing services in that area compared to their peers, such as primary care physicians, respiratory physicians or even cardiologists. Williams, et al. [56], also found that psychiatrists in the study were not familiar with services available to them and therefore referred only a quarter of the time and 10% of these were referrals to quit-line services.

**The Way Forward**

More training has been shown to improve detection, action to assist and also referral or treatment provision in both trainees and psychiatrists. A study by Prochaska et al. [53], on 55 psychiatry residents attending a four hour training session noticed an increase in knowledge, improved attitude towards tobacco dependence training in psychiatry and confidence for treatment provision. Confidence was sustained for three months in follow-up data (p<0.005). Williams, et al. [56], also found in a two day training session for 41 mental health service providers, where 51% of them were psychiatrists, that participants scored better on post test scores from 47% to 91% after day two. Participants were also very positive on feedback evaluation for this study. Apart from the general acceptance of such training for psychiatrists, Prochaska et al. [53], also found that training was cheap at US$139 per participant. Follow-up training can be maintained through continuing medical education (CME) sessions. Easton et al. [67], found that physicians (including psychiatrists) who completed >16 CME monthly hours were more likely to frequently counsel compared to those who received less. Price, et al. [55], in a study looking at child and adolescent psychiatrists, found that the more confident and prepared the respondents were, the less barriers were reported. Steinberg et al. [50], also reported that although initially referrals were low amongst psychiatrists in the study, once familiar with available services their referral rate was similar to others. Training definitely increases awareness, diagnosis documentation and subsequently treatment provision and introducing tobacco treatment specialisation (TTS) amongst psychiatrists may further assist the agenda of tobacco control within psychiatry [68].

Morris et al. [47], found from interviews that those with mental illness are already facing many barriers to access treatment. It would therefore be helpful if they could get access to tobacco control services from those trained in
both mental illness and tobacco dependence to ensure that their needs are adequately met. Prochaska et al. [52], noted that one reason for the lack of implementation of tobacco dependence treatment in all residency training centres was the lack of expertise on smoking cessation among qualified psychiatrists. Having a TTS program within each mental health service, or shared between a number of services, might improve treatment in a number of ways. A dedicated TTS would be able to “jump start” training and push for more awareness, and also be a source of information and support to other practitioners interested in tobacco dependence treatment [68-70]. Further, a TTS within a mental health service would be an excellent referral person to assist with more difficult cases within the mental health system [68].

Tobacco treatment specialist specialisation in mental health settings is one method of increasing awareness of tobacco control among practitioners [68]. As highlighted in the study by Prochaska et al. [52], one reason why residency training did not implement such training is the lack of experts. Current available treatments are medications and interventions familiar to psychiatrists such as nortriptyline and cognitive behavioural therapy for example, and the side effects that have been reported such as mood disturbances are also under the purview of psychiatrists. Having an expert in the field has an advantage in providing a supportive environment where other colleagues can exchange information and learn [68-70]. At present, those that do receive slightly more attention in tobacco dependence among mental illness patients are those with co-morbid medical illnesses [46, 61]. Although reassuring to an extent, these findings also indicate that detection is only made for the most complex of cases in psychiatry. As many of the complex mental health patients have both psychiatric and addictive disorders, specialists of all disciplines are referring more to TTS [70, 71].

The increasing establishment of smoke free mental health units will also make a difference in tobacco dependence treatment in psychiatry. However, this will also need to be complemented with a change in the current culture of psychiatry with respect to tobacco dependence [44, 66]. Inpatient admissions into a smoke free unit may encourage quitting.45 Contrary to popular belief, there is no added burden to manpower in terms of patient aggression through this action [45]. Parker, McNeill, & Ratschen [72], carried out a pilot study in four adult psychiatric wards and found 31% of patients attending tobacco dependence treatment services attempted a quit attempt, of which half were successful. This may not be feasible for some centres considering this study employed a specifically designed pathway to attain services. Nevertheless, it indicated that patients can and want to quit smoking [73]. In another study, Lawn & Pols [45] reported that mental health staff increased their quit attempts when smoke free inpatient units were established. Staff who did not smoke was more likely to be receptive of tobacco dependence treatment, and were more likely to encourage assistance and referrals [74]. Furthermore, staff who did not smoke could also become role models to patients and other staff [47, 75]. Previous studies had reported that a change in status, namely from smoking to smoke free, was not always associated with a change of culture when no clear strategies and appropriate resources were in place [72]. The culture of engaging with patients through smoking and smoking breaks needs to be addressed by both patient and mental health practitioners [40-42]. Morris et al.[47], related a patient describing his difficulties as “give me something to occupy my time. There is nothing to do….except smoke, sleep and shower”. Experiences similar to this will need serious consideration if and when all units become smoke free. Another change needed will be the management of smokers within the unit [62, 66]. The recognition of smoking and the need to address the above suggestions would need management changes in terms of ward work. Regular documentation of diagnosis, a system to remind psychiatrists and staff to follow-up on patients and familiarity with treatment both psychological and pharmacological are among some of the suggestions made by researchers in this area [42, 62, 66]. Patients themselves have also reported the use of group or peer support to be useful for them [47]. Studies have also shown that group therapy is equally effective in assisting to quit smoking [76, 77] and could easily be initiated in an inpatient or outpatient mental health setting.
Reimbursement for treatment has also been reported in several studies [49, 56, 62] as barriers to implement services. Reimbursement however needed accountability of services [77] and that is where the TTS could play a role [68, 71, 78]. Reimbursement has been shown to increase usage [79]. Although no increase in the proportion of quit attempts were found, it was suggested that changes may be too small at the national level to have a beneficial public health impact. However, unlike West et al., [79]; Thornley, Jackson, McRobbie, Sinclair, & Smith [80] found that in New Zealand not all levels of society showed increased use in pharmacological treatments (in this case, NRT) despite being subsidized. In this study, Māori and Pacific people were not shown to acquire treatment compared to those of European ethnicity. A Cochrane Review involving eleven trials had, on the other hand, reported favourable impact for smokers to quit on full subsidization but not for health providers. Smokers who were fully assisted were nearly three times likely to be abstinent for six months or more (RR 2.45, CI 1.17-5.12) [81]. Smokers were also more likely to use behavioural interventions with full aid (RR 1.77, CI 1.19-2.65) [81]. These findings are useful as smokers with mental illness were usually the more challenging patients and normally require this additional support. In addition, current evidence indicates greater success with a combination of both pharmacological and psychological interventions [57, 59, 60].

Among the major challenges faced by psychiatrists is the need to fully recognize tobacco dependence as equally important as the mental illness conditions they treat regularly. This will involve an overhaul in both medical school and residency training in psychiatry. Management changes may also be required in order for psychiatrists to be serious in their responsibility to their patients who are addicted to tobacco smoking.

Further implementation of smoke free mental health facilities is also needed. The longer these facilities are allowing psychiatric patients to smoke, the more harm is caused to the patients and mental health staff working in these facilities. The science of tobacco dependence and its treatment is rapidly advancing from the realms of genetics, imaging and also pharmacology. Psychiatrists need to be familiar with these changes in order to provide the best level of care [82]. Newer treatments, such as varenicline, can cause mood changes and has a warning for suicide [83]. Psychiatrists need to be aware of this and other potential interaction between treatment for tobacco dependence and existing treatments available. Newer devices such as electronic cigarettes, which are not yet well understood in terms of benefits and potential risk, should also be investigated by psychiatrists as treatment options for their patients [84, 85].

Conclusions

Psychiatrists have ignored tobacco dependence and its treatment for too long, resulting in multiple missed opportunities in improving the health and well-being of smokers with mental illness. Improvement in the training and knowledge of psychiatrists and those in the mental health sector will be the most effective activity to rectify this situation. More research is needed in both the pre-clinical sciences and clinical care in order to improve existing services in psychiatry and the provision of tobacco dependence treatment.

Acknowledgments

This research was funded through a doctoral student allowance from the University of Otago, New Zealand and a research grant from the University of Malaya, Malaysia. Special mention to Lindsay Atkins for help with proof reading. Declaration of conflict: All authors have no conflict of interest.

References


30. Lawn S. Should psychiatric facilities be smoke free, and are we even asking the right questions? Australas Psychiatry. 2007; 15: 246.


58. CAN-ADAPTT. Canadian Smoking Cessation Clinical Practice Guideline. Toronto, Canada: Canadian Action Network for the Advancement, Dissemination and Adoption of Practice-informed Tobacco Treatment, Centre for Addiction and Mental Health., 2011.


Corresponding author: Dr. Amer Siddiq Amer Nordin, National Addiction Centre, PO Box 4345, Christchurch 8140, New Zealand.

Email: amersiddiq@um.edu.my

Received: 3 March 2014 Accepted: 19 June 2014
Food Addiction Does Not Explain Weight Gain in Smoking Cessation

Amer Siddiq Amer Nordin\textsuperscript{1,2,3}, Simon Justin Adamson\textsuperscript{1}, and John Douglas Sellman\textsuperscript{1}

\textsuperscript{1}National Addiction Centre, University of Otago, Christchurch, New Zealand
\textsuperscript{2}University Malaya Centre of Addiction Sciences, University Malaya, Kuala Lumpur, Malaysia
\textsuperscript{3}Department of Psychological Medicine, University Malaya, Kuala Lumpur, Malaysia

\textbf{Introduction:} Weight gain during smoking cessation is a major concern. The relationship between smoking and weight is complex and not well understood. There is interest in substitution of nicotine with food.

\textbf{Aims:} This study investigates whether the development of food addiction explains weight gain following a quit smoking attempt.

\textbf{Methods:} This study was a subset of a larger study investigating smoking cessation in New Zealand. Participants were assessed on five visits over a 1-year period. Using validated instruments, measurements for smoking, weight, food intake, craving and food addiction were taken.

\textbf{Results:} Among the 256 participants, 54.7\% attended at least one follow-up. Food addiction prevalence at baseline was 0.8\%, 14.5\% were quit at early follow-up and 14.8\% at late follow-up. Weight gain was found in abstainers compared to those still smoking. No increase in food addiction was detected.

\textbf{Conclusion:} The development of food addiction does not play a prominent role in post quit weight gain. Further research is needed to elucidate the underlying weight gain mechanisms.

\textbf{Introduction}

A commonly described issue faced by those attempting to discontinue smoking is weight gain (Bush et al., 2008). A meta-analysis by Aubin, Farley, Lycett, Lahmek, and Aveyard (2012) found 34\% gain between 5 and 10 kg as early as 3 months after quitting smoking and a further 13\% gain more than 10 kg during the same period. The authors concluded that although weight gain can be short-lived for some, the weight gain is not infrequently sustained longer term.

The possibility of substituting addictions is receiving increased attention (Sussman et al., 2011). There is growing evidence that food, especially hyper-palatable foods which are foods that include carefully engineered combinations of fat, sugar and salt may act similarly to recreational drugs in their action (Garrard & Corbin, 2011). Neuroimaging studies have found certain foods release dopamine in the limbic system, similarly to addictive substances (Volkow, Wang, Tomasi, & Baler, 2013). Smokers who quit often report a desire for sweet foods (Rodin, 1987). Moreover, sugar, independent of fat, has been shown to be responsible for weight gain, which may account for a proportion of the weight gained during smoking cessation (Te Morenga, Mallard, & Mann, 2013). The development of food addiction allows an alternative explanation for at least some of the observed weight gain following smoking cessation (Audrain-McGovern & Benowitz, 2011). To date, no clinical studies have tested the role of food addiction as an explanation for weight gain after quitting smoking.

This study investigates whether this possibility explains weight gain during a smoking cessation attempt.

\textbf{Methods}

This study was an additional investigation on the subset of a larger study, the Zonnic\textsuperscript{TM} and Patch (ZAP) study, which investigated nicotine replacement therapy in the form of an oral spray (Zonnic\textsuperscript{TM}), in quitting smoking in a New Zealand sample. The ZAP study randomised participants to a nicotine or placebo spray for 6 months. All participants were supplied with nicotine patches and asked to use them daily for 5 months together with brief intervention and appreciative therapy at each visit. Participants were followed at regular intervals for 12 months.
The ZAP study recruited participants at three sites (two in Wellington and one from Christchurch) through the mass media and also referrals from local hospitals and clinicians (Caldwell, Adamson, & Grane, 2014). The current investigation gathered additional data relating to food consumption and included only the Christchurch sample which was the largest group and where the primary investigator was based. This study was approved by the central Health and Disability Ethics Committees (HDEC), Ethics Reference CEN/09/08/055.

**Subjects**

A total of 256 participants were recruited to the present study. Participants were included if they smoked > 9 cigarettes per day, wanted to quit, were between 19 and 70 years old, resided in Christchurch and agreed to complete follow-up. Excluded were those with allergy or using medications known to interact with NRTs, reported currently taking psychoactive medications or illicit drugs, drank > 21 standard units of alcohol per week, serious medical conditions including high blood pressure, cardiovascular health problems (including fast or irregular heart rhythm, angina, chest pain, a previous myocardial infarct), cerebrovascular event such as a stroke, previous history of stomach ulcer, heartburn, kidney disease, liver disease, an over active thyroid, pheochromocytoma and uncontrolled diabetes. Those sexually active and not using adequate contraception or pregnant were also excluded.

**Assessment Methods**

Participants were assessed on five occasions: at baseline and at 1, 3, 6 and 12 months after being enrolled into the study. At the baseline visit, socio-demographic and smoking information was recorded.

**Assessment Tools**

Nicotine dependence was assessed using the Fagerstrom Test for Nicotine Dependence (FTND) (Courvoisier & Etter, 2010), a six-item scale that is widely employed in smoking cessation research. Abstinence was defined as not smoking any cigarettes, not even a puff for 7 days in the past week verified by carbon monoxide measurement, <10 parts per million. The 7-day point prevalence is the most often used method to report abstinence in smoking cessation trials (Hughes et al., 2003).

In order to identify the extent of unhealthy food consumption participants completed a food assessment using the Non-essential Energy Dense Nutritionally Deficient Food List (NEEDNT) (Elmslie, Sellman, Schroder, & Carter, 2012). For this study, a modified list of 44 items which merged similar food items from the original 30 was used to reduce repetition (Personal communication with RS) and consumption of these foods was assessed over the past month. Higher scores indicated higher overall consumption of nutritionally poor, high calorie foods. Eder (2013) describes the development and reliability of the NEEDNT. Craving for such foods was measured using the Questionnaire for Craving of Sweet and Rich Foods (QC-SRF), designed to assess craving in smoking populations (Toll, Katulak, Williams-Piehota, & O’Malley, 2008) and we have previously shown to be valid for the current sample (Amer Siddiq, Adamson, Schroder, & Sellman, 2013; Toll et al., 2008).

The presence of food addiction was assessed using the modified Yale Food Addiction Scale (mYFAS) (Flint et al., 2014). The mYFAS was derived from DSM-IV and various scales used to assess behaviour addictions. It contains nine items and has been found to be valid and sensitive to detect food addiction (Flint et al., 2014).

**Statistical Analysis**

For analysis, the latest follow-ups of 1 and 3 months were reported as 'early' follow-up and similarly, the latest of follow-ups at 6 and 12 months were reported as 'late' follow-up. Continuous variables were analysed using t-tests and dichotomised variables were analysed using chi-square tests.
Results

Participants’ characteristics are presented in Table 1. Participants had a mean age of 46.2 years and 54.7% of the sample was female.

Baseline Weight and Eating Status

The mean weight was 79.9 kg (range 40–185, SD = 19.1) and the mean BMI (kg/m²) was 27.4 (range 16.41–74.11, SD = 6.2) with a median of 26.4. More than half (63.7%) were overweight (n = 95, 37.1%) or obese (n = 68, 26.6%), whilst a very small number of participants were found to be underweight (n = 4, 1.6%).

The mean baseline food craving score (QCSRF) was 18.1 (range 9–50, SD = 8.5) and the food assessment scores (NEEDNT) varied considerably from 11 to 285 (mean = 76, SD = 45.7). Only two individuals met criteria for the diagnosis of food addiction using the myFAS (0.8%) at baseline prior to the index quit attempt.

Follow-up

Of the 256 participants, 140 (54.7%) attended at least one of the follow-up visits. 124 (48.4%) attended at least one early follow-up and 94 (36.7%) attended at least one late follow-up. The mean duration for follow-up was 93 days (range 42–182, SD = 34.3) and 380 days (range 196–664, SD = 84.0). There were no significant differences in baseline characteristics, as outlined in Table 1, between those followed-up or not.

The CO verified quit rate was 14.3% at early follow-up and 14.8% at late follow-up.

Mean weight increased significantly from baseline to early follow-up from 79.3 kg (16.9) to 81.2 kg (17.3) (t (118) = −7.6, p < 0.001) and from baseline to late follow up from 82.0 kg (17.3) to 85.1 kg (17.9) (t (87) = −6.11, p < 0.001) (Table 2). This gain in weight was also seen in both male and female over the period (F (1, 107.8) = 23.9, p < 0.001). Those who achieved abstinence at early follow-up gained 3.3 kg compared to 1.1 kg in those still smoking, which was statistically significant on univariate ANOVA (F (1,115) = 21.23, p < 0.001). Similarly, at late follow-up, participants who were abstinent gained 4.5 kg compared with 1.8 kg for participants still smoking (F (1, 84) = 8.35, p = 0.005).

Unhealthy eating (NEEDNT scale) and food craving (QCSRF), both reduced over time. However, only the change between baseline (M = 17.15, SD = 8.67) and late follow-up (M = 13.98, SD = 5.51) for food craving of −3.17 was statistically significant (t (55) = 2.79, p = 0.007) (Table 2).

No cases of food addiction were detected at early follow-up and only one case (1.1%) at late follow-up, using the myFAS.

Discussion

This is the first clinical study to our knowledge investigating the potential development of food addiction in people undergoing a quit attempt from tobacco smoking.

Mean weight increased at both follow-up periods, irrespective of gender, with weight gain greater for those who successfully achieved abstinence, consistent with studies reported elsewhere (Aubin et al., 2012).

The main finding of this study was the lack of evidence that food addiction plays a part in the weight gain of people who choose to quit smoking. Less than 1% of participants at both baseline and follow-up were diagnosed with food addiction.

Further, food craving (QCSRF scores) were unchanged at early follow-up and showed a decline by late follow-up, reflecting no increase in craving for hyper-palatable foods. Craving is a central feature of addiction and might be expected to increase to compensate for the lack of nicotine as participants quit their smoking. This reduction, rather than increase, in craving was also consistent with lower NEEDNT scores observed at follow-up, indicating reduced rather than increased consumption for hyper-palatable foods.

The current study had 63.9% of participants who were overweight and obese, which is similar to the general New Zealand population. However, the prevalence of food addiction was <1%, which is considerably lower than the 6.3%, 14% and 37% found, respectively in healthy weight, overweight and obese people in a general population sample reported by Meule (2011). Flint et al. (2014) reported...
those with obesity who smoked compared to obese non-smokers were less likely to meet criteria for food addiction (OR 0.69, CI: 0.51–0.81), which the authors suggest may be due to nicotine addiction masking food addiction at baseline. In the present study, we did not find an increase in food addiction in a sample making a quit attempt, with approximately 15% successfully quitting.

A potential confounder might have been the relatively large drop-out from this study (as is often the case in smoking cessation trials) (Etter & Stapleton, 2006). Participants lost to follow-up might potentially have been more likely to have developed food addiction. However, there were no differences in baseline food and weight variables, between participants who attended follow-up and those who did not, which makes this explanation unlikely.

Conclusion
No increase in the rate of food addiction, food craving or unhealthy eating was observed among those who quit smoking in this study. This suggests that the development of food addiction does not play a prominent role in post quit weight gain. Further research is needed to elucidate the underlying weight gain mechanisms.

Acknowledgements
We would like to thank Professor Julian Crane for his assistance in this study.

Financial Support
This research was funded through a doctoral student allowance from the University of Otago, New Zealand and a research grant OCAR (P&I) 2011 from the University of Malaya, Malaysia.

Conflict of Interest
All authors have no conflict of interest to declare during the period of the study.

Ethical Standards
‘The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008’.

References


Eder, B. (2013). Development and Reliability of a Short Food Frequency Questionnaire to Assess Intake of Non-Essential Energy-Dense Nutritionally-Deficient (NEEDNT) Food Items. (Dietetics Masters), University of Otago, Dunedin.


**SMOKING CESSATION, DEPRESSION AND WEIGHT**

Smoking remains a serious public health problem despite growing evidence of its link with various health problems. This includes cardiovascular and respiratory problems, low birth weight in pregnancy and the more debilitating illnesses like cancers. Worldwide, five million people die yearly as a consequence of smoking related illnesses. The World Health Organization (WHO) predicts an additional 3 million deaths by 2030. Closer to home five thousand New Zealanders die because of smoking related illnesses each year.

Despite best efforts over the years, the prevalence of adults smoking in New Zealand has dropped minimally from 25% in 2000 to 22% in 2008. Although some believe this is acceptable, others feel more can be done. Minority groups in New Zealand, such as Māori and the mentally ill, have higher prevalence, 45.6% and 33% respectively. Borelli et al. (2010) has coined the term “underserved” population for these smokers, together with smokers from lower socio-economic groups and those with medical co-morbidities. Another term used is “special” population. Borelli et al. argues that it is this group where access and improvements to treatment have been lacking and this is thought to be the reason why current prevalence has not dropped further in most developed nations.

Depression in relation to smoking is of particular interest. Depression and smoking appear to be closely connected (see review by Wilhelm, 2006), however what is also known is that having depression and quitting smoking leads to poorer outcomes, i.e. more unsuccessful quit attempts. Despite needing to better understand how to support smokers with depression this group of smokers are often excluded from quit smoking treatment trials. Reasons for this are concerns that they are not interested in quitting and that quitting worsens their depressive illness. As a result, present treatment options may not be completely relevant for these co-morbid patients.

Weight gain is also of considerable interest and relevance to smoking cessation. For clinicians, this appears to be a common complaint. Modest gains of up to five kilograms are reported to be the norm. Unfortunately, those who do gain weight often have poorer outcomes when quitting smoking. The reason for this is obviously an imbalance
between energy input and output but what is the precise mechanism is not fully understood. A return of taste resulting in a preference for sweet and rich foods is one explanation. Diminished serotonin levels during quitting smoking leading to “comfort eating”, usually of sweet and rich foods, which can alter brain serotonin levels alleviating these symptoms is another. Following on from the idea of selective food preferences, there have been suggestions that switching of addictions may occur between substance and behavioural addiction. This is certainly worth investigating further, with food addiction recently being recognised as a research and clinical entity.

In 2010, the Zonnic and Patch Study (ZAP) was launched by the Wellington School of Medicine. The National Addiction Centre became involved in April of the same year. Five hundred and fifty patients were to be recruited in Christchurch from a total of sixteen hundred. The ZAP study is a randomised controlled clinical trial looking at the effectiveness of Zonnic™, a newer form of nicotine replacement therapy. This study will run from 2010 to 2012.

Using the ZAP study, about 250 patients from the 550 will be included in another study aimed to investigate the interrelationship between depression and weight gain in a smoking cessation programme. This new study will use a mixed method (MM) research approach. MM uses both a quantitative and a qualitative research approach, allowing the researcher to not only investigate the variables of interest but also understand and explore the ”lived experience” of patients participating in the programme. Data collection will use validated instruments on depression, food craving and addiction, and measurement on weight will be taken a total of five times corresponding with five visits for the ZAP study. Qualitative data will be obtained using focus group discussion and individual interviews. Purposive sampling will be used in order to obtain a “rich data” set. For the quantitative data, analysis will be using statistical package for social sciences (SPSS) version 19. Qualitative data will be using thematic analysis and presented using matrix analysis. Storing will be using software Nvivo version 9. Data collection has already commenced and recruitment for the ZAP study is expected to end on 31st May 2011. Qualitative data collection will start from August 2011.

On 22 February 2011, Christchurch was hit by a 6.3 magnitude earthquake. This happened in the midst of data collection in a smoking cessation clinical trial. Whilst some patients had relapsed to smoking as a result of this natural disaster, there were others who did not. A brief literature review conducted showed no articles related to smoking cessation trials and natural disasters and this is therefore worthy of further exploration. This experience may increase our understanding regarding issues related to resilience.

It is hoped that the outcomes from this study will assist future management of patients with depression who smoke. It is also hoped that the qualitative data obtained will give us a better understanding of the experiences of patients attending a quit smoking programme and provide a glimpse on the issue of resilience during a natural disaster.

Amer Nordin
PhD Student
National Addiction Centre
University of Otago, Christchurch

Acknowledgments
This study will be my doctorate study and will be funded by a PhD grant from University of Otago, Christchurch and University Malaya, Malaysia.

References:
A Mixed Method Approach in the Study of Depression in Patients Undergoing Tobacco Cessation Treatment

Amer Siddiq Amer Nordin, PhD Student, National Addiction Centre, University of Otago, Christchurch

Authors: Dr Amer Siddiq Amer Nordin, Dr Simon Adamson, Prof Doug Sellman

Institution: National Addiction Centre, University of Otago, Christchurch

Abstract

Despite continuous efforts, smoking is still a prevalent problem in New Zealand, accounting for five thousand deaths yearly as a consequence of smoking related illnesses. Prevalence rates have remained at around twenty percent for a number of years after a noticeable decline from the 1980-1990's level. One possible reason for this has been the idea that present treatments do not address “special” populations among smokers. This group includes those from lower social economic backgrounds, smokers with co-morbid medical illnesses and mental illness. Of interest are those with depression and how they fare in treatment. Often they are excluded from smoking cessation treatment trials despite higher prevalence of smoking and poorer outcomes to treatment. Another interest is weight gain, which is equally as important in smoking cessation treatment, and how it relates to depression. Therefore this study aims to investigate associations between smoking cessation, depression and weight in an ongoing randomised controlled trial on Zonnic™, a new medication for smoking cessation currently being conducted in Christchurch. The study also attempts to explore and understand the experiences of those patients participating in a smoking cessation program. More recently, the earthquake which affected Christchurch in February 2011 posed additional questions on resilience which will be explored during these same sessions. In order to answer the research questions posed, a mixed method design will be used as it allows the use of both approaches to data collection. Quantitative data will be collected using additional validated rating instruments for depression, whereas qualitative data collection will be collected through focus groups and individual interviews using semi-structured interviews. This presentation will discuss the approach used and hopes to generate further ideas to improve this ongoing project.

Biography

Dr Amer Siddiq Amer Nordin is a psychiatrist from Malaysia attached to the University of Malaya. He graduated in 2002 from the University of Otago and has decided to continue his studies in addiction by pursuing a PhD with the National Addiction Centre. His interest is mainly in nicotine addiction where he plans to do further work on his return to Malaysia.
Combination Rapid-Acting Nicotine Mouth Spray and Nicotine Patch Therapy in Smoking Cessation

Brent O. Caldwell MBChB, Simon J. Adamson PhD, Julian Crane MBBS

1Department of Medicine, University of Otago Wellington, Wellington, New Zealand; 2National Addiction Centre, University of Otago Christchurch, Christchurch, New Zealand

Corresponding Author: Julian Crane, MBBS, Department of Medicine, Wellington School of Medicine, PO Box 7343, Wellington, New Zealand. Telephone: 64-(0)4-918-5258; Fax: 64-(0)4-389-5427; E-mail: julian.crane@otago.ac.nz

Received December 30, 2013; accepted April 17, 2014

ABSTRACT

Introduction: Improved smoking cessation rates are urgently required if New Zealand is to reach its target of a smokefree nation by 2025, during which some 600,000 smokers will need to quit. Nicotine replacement therapy remains a core part of the pharmacological approach to smoking cessation. Oral nicotine solutions with rapid onset have recently become available. We have examined the effect of a nicotine spray and a nicotine patch on smoking cessation for 12 months.

Methods: We enrolled potential participants—smokers wanting to quit aged 18–70 years, who smoked ≥9 cigarettes per day—with Fagerström Test of Nicotine Dependence score ≥3 in a double-blind trial in 3 trial sites. Smokers were randomized to a nicotine or placebo spray for 6 months, and all received nicotine patches daily for 5 months. They were followed at regular intervals for 12 months.

Results: A total of 1,423 subjects were randomized to nicotine oral spray (1 mg of nicotine free base per spray) plus nicotine patch or a placebo spray and nicotine patch. The nicotine mouth spray plus nicotine patch showed significant improvements in prolonged abstinence for all measures to 6 months (7 consecutive days at each visit for 6 months: 15.5% vs. 10.6%; p = .006) for the combination versus placebo and nicotine patch. Thereafter, the differences were not significant.

Conclusions: The addition of a nicotine mouth spray to a nicotine replacement patch in a population of smokers receiving a low level of behavioral support improved early quitting, but the effects were not sustained.

INTRODUCTION

In 2009, the Smokefree Coalition (a group of nongovernmental organizations and patient support organizations) proposed an end to retail tobacco sales in New Zealand by 2025. Others took up this “endgame” idea, which then became a focus of the Māori Affairs Select Committee inquiry into the tobacco industry. The government responded to the inquiry’s findings by confirming the national goal of a smokefree New Zealand by 2025 (NZ Parliament, 2011), thereby providing a stimulus and focus for a wide range of activities to help achieve this. One of these activities is improved smoking cessation, as there are 600,000 smokers who need to quit over the next 11 years. Smoking cessation is particularly important for Māori whose prevalence of adult smoking was 45% compared with 20% for non-Māori in 2009 (Ministry of Health, 2010). Nicotine replacement therapy (NRT) is the mainstay of pharmacological cessation therapy in New Zealand, and nicotine gum, lozenges and patches are provided free to all smokers. Newer fast-acting nicotine replacements such as oral nicotine sprays are not subsidized but have recently become available.

NRT has been shown to double the quit rates compared with placebo (Stead, Perera, Bullen, Mant, & Lancaster, 2008). More rapidly acting NRT products are available but have not entered widespread use, despite showing greater efficacy (Blondal et al., 1999) and often more rapid and effective quenching of smoking urges (McRobbie et al., 2010). Similarly, combined NRT treatments have also been shown to improve cessation (Croghan et al., 2003) but are rarely offered to smokers in New Zealand (McDermott, Beard, Brose, West, & McEwen, 2012). Indeed, one of the first such studies, which was published in the BMJ, showed marked improvements in cessation for 6 years from a combination of 5 months of a nicotine patch and 1 year of a nicotine nasal spray, compared with patch and placebo nasal spray (Blondal et al., 1999). However, when nicotine is delivered to the nasal mucosa it is rapidly absorbed but causes significant local side effects. (Watts, Noble, Smith, & Disco, 2002). Two small pharmacokinetic and acceptability studies of the two available nicotine mouth sprays (NMS) have confirmed rapid absorption and rapid relief of craving (Kraiczi, Hansson, & Perfekt, 2011; McRobbie et al., 2010). A recent randomized trial of NMS versus placebo confirmed significantly higher...
absence rates from 2 to 52 weeks post cessation (Tinnnesen, Lauri, Perfelt, Mann, & Batra, 2012). However, it is important to compare new NRTs against current and best available treatments, rather than against placebo when such treatments have been shown to be effective. To that end, we have conducted a parallel-group randomized placebo-controlled trial examining the effect of a fast-acting NMS added to current nicotine patch therapy among an unselected group of current moderately heavy adult New Zealand smokers.

METHODS

Setting and Participants

The trial was conducted in clinical facilities at the University of Otago in Wellington and Christchurch, and in the Wellington community at Kōkiri Mara health services, which conducts a variety of clinical services including smoking cessation. We enrolled smokers of ≥9 cigarettes per day (CPD), with Fagerström Test of Nicotine Dependence (FTND) score ≥3 (Heatherton, Kozlowski, Frecker, & Fagerström, 1991), and aged 18–70 years. Smokers were ineligible if they reported currently taking psychotropic medications or illicit drugs, drank >28 standard units of alcohol per week, reported a history of hyperthyroidism, diabetes, severe renal or hepatic disease, or were female and using inadequate contraception or were breast feeding. Smokers who had uncontrolled hypertension, unstable angina, myocardial infarction, or stroke in the past 3 months required the approval of their physician before being enrolled.

Randomization, Allocation Concealment, and Blinding

Subjects were randomized centrally for all three trial sites using a random allocation algorithm built into the Access database that was used for all of the data collection, after being screened and before commencing their baseline visit. Active and placebo bottles were identical and were labeled with a unique product code and allocated randomly to each subject by the database.

Placebo contained the same peppermint flavor as active mouth spray and had sufficient capsaicin added to match the pungent sensation from the active product. All staff remained blind to the allocation during the course of the trial.

Intervention

Both groups received 5 months of 24-hr nicotine patches (Habitrol, Novartis), 21 mg for the first 18 weeks, followed by 14 mg, and then 7 mg in the final 4 weeks. The active and placebo groups received 6 months of active and placebo NMS, respectively, to use ad libitum when they felt the urge to smoke, up to a maximum of 30 sprays per day. Participants were encouraged to use the spray occasionally rather than to use cigarettes after the end of the treatment periods. The active mouth spray consisted of 1 mg of nicotine (as the free base) per spray actuation, ethanol, and peppermint flavoring contained in an opaque spray bottle. The active NMS (Zonnic) was manufactured by Niconovum. The placebo was manufactured by Argenta Ltd in Auckland according to a formula developed by Niconovum and contained peppermint, anhydrous glycerol, anhydrous ethanol, and capsicin; it was dispensed in identical opaque bottles provided by Niconovum. Subjects received brief counseling, and Appreciative Inquiry (Moore & Charvat, 2007) at all contact times.

Procedures and Schedule of Visits

Subjects were invited to participate from widespread media interest and advertising and from a database of subjects interested to try and stop smoking. Subjects were also referred from clinicians in local hospitals and in the community. Subjects were screened by telephone and invited to attend a baseline visit. After obtaining informed consent, subjects were randomized, completed researcher-administered questionnaires, and were given a patch and a dose of mouth spray, so they could rate their opinion of these products. All subjects were encouraged to start using the mouth spray and patches from the date of their baseline visit, and reduce the number of cigarettes smoked by at least a quarter each week over the next 3 weeks. Subjects set a target quit date no later than 3 weeks after their baseline visit and could choose whether to schedule their first telephone call on their target quit date or 1 day either side, because the purpose of the call was primarily to provide encouragement and not to record quit success. Subjects who failed to quit on target were given the opportunity to set further quit dates if they were within the grace period of 4 weeks after the target quit date, and a second phone-call date was booked. Subjects attended five clinic visits (at baseline, 1, 3, 6, and 12 months after the quit date) and received two phone calls (around the quit date, and again 9 months later).

Outcome Measures

The primary outcome was prolonged abstinence from the end of the grace period to 12 months after the target quit date. The target quit date was 4 weeks after baseline, and the grace period was 4 weeks after the target quit date. Abstinence was defined as not smoking even a puff on any consecutive days at any time since the target quit date (Hughes et al., 2003). Secondary outcomes included not smoking on two consecutive weeks, 7-day point prevalence biochemically verified by exhaled carbon monoxide (CO) of <10 ppm, amount of NMS used, reduction in urges to smoke and withdrawal symptoms, and the sensory and side effects of the mouth sprays. Uges to smoke were measured by the 10-item brief Questionnaire of Smoking Urges (Cox, Tiffany, & Christen, 2001). Withdrawal over the past 24 hr was measured by the Minnesota Nicotine Withdrawal Scale (MNWS) (Cappelleri et al., 2005). Potential side effects were measured on ad-hoc Likert scales. Exhaled CO was measured using a COmputable Smokelyzer (Bedfont Scientific Ltd).

Sample Size and Analysis

We estimated sample size from a contemporary study of 2,716 smokers using NRT undertaken by the New Zealand Quitline in 2008 (The QuitGroup, 2009). In an intention-to-treat analysis, they found 17% quit (7 consecutive days abstinence and no more than 5 cigarettes overall) at 6 months. We reduced this by 35% to estimate a quit rate of 12% at 12 months. In order to detect a relative risk of 1.5 or greater with 90% power and significance at 0.05, we estimated that we would need 742 subjects in each arm. Analysis was undertaken according to a prespecified plan using R version 2.15.2 (R Development Core Team, 2010). All tests of significance were conducted at the 5% level. Abstinence rates were compared by the chi-square test without continuity correction, using an intention-to-treat analysis that counted all subjects lost to follow-up as smokers. The
Nicotine mouth spray and nicotine patch therapy in smoking cessation

significance of nonnormally distributed data was calculated with the Mann–Whitney test. Odds ratios (ORs) for abstinence were calculated by binomial generalized linear models (GLM). The adequacy of the blinding was calculated with the binomial test. Because CO readings were missing in more than 10% of those who claimed not to have smoked in the past 7 days, and the effect size of treatment was affected in other trials with this level of missing CO data (Benowitz et al., 2002), we used an approach similar to the Russell Standard, by considering as biochemically confirmed abstinent those subjects whose CO readings were missing at one timepoint if at their next visit they reported not smoking even a puff in the past 7 days and had a CO level below 10 ppm. Socioeconomic status, based on subjects’ address, was calculated from the New Zealand Index of Deprivation 2006, which is an index of deprivation based on census area units, scored from 1 (least deprived) to 10 (most deprived) (Salmond, Crampton, King, & Waldegrave, 2006).

Ethical and regulatory approval was obtained from the Central Regional Ethics Committee and the Standing Committee on Therapeutic Trials, and all subjects provided written informed consent.

RESULTS

Subjects

Subjects were recruited between March 2010 and August 2011, and the last subject completed in May 2012. A total of 1,423 subjects were randomized. The flow of subjects through the study is illustrated in Figure 1. Subjects in the two groups were similar in their demographics and nicotine dependence at baseline, but the placebo group had slightly more prior attempts to quit smoking (Table 1): 104 (14.5%) and 86 (12.2%) participants completed the 12-month study visit, 359 (50.1%) and 383 (54.2%) participants failed to quit regular smoking, and 253 (35.3%) and 238 (33.7%) participants were lost to follow-up in the active and placebo groups, respectively.

2408 people contacted the study

Screened n=2286

Eligible n=1912; † n=487

Attended baseline visit n=1425

Eligible n=1424

Randomised n=1423

Active n=716; † n=49; ‡ n=8

1st Quit Phone n=659; †n=98; ‡ n=90; †n=4

2nd Quit Phone n=178; †n=11; ‡ n=76;

1 month visit n=395; †n=53; ‡ n=115; †n=4

3 month visit n=228; †n=29; ‡ n=47; †n=5

6 month visit n=154; †n=9; ‡ n=18; †n=3

9 month phone n=131; †n=9; ‡ n=22

12 month visit n=104

Placebo n=707; † n=54; ‡ n=11

1st Quit Phone n=642; †n=93; ‡ n=104; †n=7

2nd Quit Phone n=193; †n=22; ‡ n=81;

1 month visit n=341; †n=44; ‡ n=116; †n=6

3 month visit n=186; †n=17; ‡ n=48; †n=4

6 month visit n=123; †n=4; ‡ n=20; †n=3

9 month phone n=101; †n=4; ‡ n=14

12 month visit n=86

Figure 1. Subject flow diagram, number of subjects who attended or provided data by telephone.
† Attended this visit/phone-call but LTFU after this stage; ‡ not abstinent at this stage and withdrew consent; ‡ missed the next visit/phone-call but attended a subsequent visit/phone-call.
Table 1. Subject Characteristics at Baseline, M (SD)

<table>
<thead>
<tr>
<th>Item, n = number of complete data$^a$</th>
<th>Active (n = 716)</th>
<th>Placebo (n = 707)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), n = 1,416</td>
<td>45.6 (11.4)</td>
<td>45.3 (11.9)</td>
<td>.67</td>
</tr>
<tr>
<td>Gender, n = 1,421: female (%)</td>
<td>52.3</td>
<td>55.0</td>
<td>.34</td>
</tr>
<tr>
<td>Ethnicity, n = 1,415: European (%)</td>
<td>71.2</td>
<td>70.0</td>
<td>.55</td>
</tr>
<tr>
<td>Māori (%)</td>
<td>14.4</td>
<td>16.1</td>
<td>.43</td>
</tr>
<tr>
<td>CPD, n = 1,423</td>
<td>20.0 (7.3)</td>
<td>20.0 (7.5)</td>
<td>.92</td>
</tr>
<tr>
<td>FTND, n = 1,423</td>
<td>6.1 (1.8)</td>
<td>6.1 (1.7)</td>
<td>.82</td>
</tr>
<tr>
<td>eCO (eCO key—1: 0–6 ppm; 2: 7–10 ppm; 3: 11–15 ppm; 4: 16–25 ppm; 5: 26–50 ppm; 7: &gt;51 ppm), n = 1,393</td>
<td>4.7 (1.2)</td>
<td>4.7 (1.3)</td>
<td>.47</td>
</tr>
<tr>
<td>Age started smoking daily (years), n = 1,400</td>
<td>16.2 (4.2)</td>
<td>16.2 (3.8)</td>
<td>.30</td>
</tr>
<tr>
<td>Live with other smoker(s), n = 1,414 (%)</td>
<td>44.7</td>
<td>42.8</td>
<td>.50</td>
</tr>
<tr>
<td>% who talked to professional about smoking cessation, n = 1,417</td>
<td>72.6</td>
<td>72.9</td>
<td>.90</td>
</tr>
<tr>
<td>% who had tried to quit smoking before, n = 1,421</td>
<td>95.1</td>
<td>94.2</td>
<td>.52</td>
</tr>
<tr>
<td>% who had used NRT before, n = 1,416</td>
<td>79.8</td>
<td>81.6</td>
<td>.45</td>
</tr>
<tr>
<td>Number or previous quit attempts, n = 1,325</td>
<td>4.5 (9.1)</td>
<td>4.9 (8.0)</td>
<td>.03</td>
</tr>
</tbody>
</table>

Note. CPD = average number of cigarettes smoked per day; FTND = Fagerström Test for Nicotine Dependence; eCO exhaled carbon monoxide.

$^a$n = number of subjects who provided data for this outcome.

Table 2. Abstinence Outcomes

<table>
<thead>
<tr>
<th>Follow-up (month)</th>
<th>Patch and active spray</th>
<th>Patch and placebo spray</th>
<th>GLM adjusted for treatment$^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent abstinent</td>
<td>Proportion abstinent</td>
<td>Percent abstinent</td>
</tr>
<tr>
<td>Not smoked on 7 consecutive days, assume all missing data are smokers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-Month visit</td>
<td>34.4</td>
<td>246/716</td>
<td>24.6</td>
</tr>
<tr>
<td>3-Month visit</td>
<td>24.7</td>
<td>177/716</td>
<td>17.0</td>
</tr>
<tr>
<td>6-Month visit</td>
<td>16.2</td>
<td>116/716</td>
<td>11.9</td>
</tr>
<tr>
<td>9-Month visit</td>
<td>13.5</td>
<td>97/716</td>
<td>10.7</td>
</tr>
<tr>
<td>12-Month visit</td>
<td>11.6</td>
<td>83/716</td>
<td>9.1</td>
</tr>
<tr>
<td>12-Month prolonged</td>
<td>10.1</td>
<td>72/716</td>
<td>7.1</td>
</tr>
<tr>
<td>6-Month prolonged</td>
<td>15.5</td>
<td>111/716</td>
<td>10.6</td>
</tr>
<tr>
<td>Not smoked in 2 consecutive weeks, assume all missing data are smokers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Month</td>
<td>28.5</td>
<td>204/716</td>
<td>21.9</td>
</tr>
<tr>
<td>3 Months</td>
<td>21.1</td>
<td>151/716</td>
<td>15.0</td>
</tr>
<tr>
<td>6 Months</td>
<td>15.1</td>
<td>108/716</td>
<td>11.0</td>
</tr>
<tr>
<td>9 Months</td>
<td>12.6</td>
<td>90/716</td>
<td>10.0</td>
</tr>
<tr>
<td>12 Months</td>
<td>10.3</td>
<td>74/716</td>
<td>8.8</td>
</tr>
<tr>
<td>12-Month prolonged</td>
<td>8.5</td>
<td>61/716</td>
<td>6.9</td>
</tr>
<tr>
<td>6-Month prolonged</td>
<td>14.0</td>
<td>100/716</td>
<td>9.8</td>
</tr>
<tr>
<td>Not smoked even a puff in past 7 days biochemically verified, Russell Standard’s method for dealing with missing data$^c$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Month</td>
<td>20.9</td>
<td>150/716</td>
<td>16.3</td>
</tr>
<tr>
<td>3 Months</td>
<td>18.9</td>
<td>135/716</td>
<td>12.0</td>
</tr>
<tr>
<td>6 Months</td>
<td>13.3</td>
<td>95/716</td>
<td>9.8</td>
</tr>
<tr>
<td>12 Months</td>
<td>9.5</td>
<td>68/716</td>
<td>8.5</td>
</tr>
<tr>
<td>12-Month prolonged</td>
<td>8.8</td>
<td>63/716</td>
<td>6.5</td>
</tr>
<tr>
<td>6-Month prolonged</td>
<td>12.4</td>
<td>89/716</td>
<td>8.1</td>
</tr>
</tbody>
</table>

Note. Binomial generalized linear model (GLM).

$^a$Models were adjusted for treatment only.

$^b$p values compare the difference between groups in proportion abstinent and were calculated by Pearson’s chi-square test without continuity correction, and were similar to the p values calculated by the logistic regression.

$^c$7-Day point prevalence was not recorded at 9 months.

Abstinence

Active NMS + nicotine patch yielded significantly higher prolonged and point-prevalence abstinence rates compared with placebo + nicotine patch, by all three definitions of abstinence, up to 6 months after quitting but not beyond this timepoint (Table 2). The primary outcome, prolonged 12-month abstinence (not smoked even a puff on 7 consecutive days, at each follow-up, from the end of the grace period to 12 months postquitting) was 10.1% (72/716) in the active group compared with 7.1% (50/707) in the placebo group.
OR 1.47 (95% confidence interval [CI] = 1.01–2.12), which was of borderline significance ($p = .045$). Other measures of abstinence as shown in Table 2 show similar outcomes for quit success. Adjustment for the single baseline characteristic that was significantly different between groups (number of prior quit attempts) did not materially alter the unadjusted values, and the number of prior quit attempts was not a significant predictor of abstinence.

**Adverse Effects**

Subjects using the active mouth spray reported significantly more severe side effects compared with placebo at the initial test dose at baseline and remained true for most side effects up to the 12-month visit. Side effects consisted predominantly of upper gastrointestinal symptoms and although slightly more severe and more frequent for the active versus placebo were in general mild and self-limiting (Supplementary Table 1).

**Use of Mouth Spray**

The amount of mouth spray and patches that subjects used was similar between active and placebo groups at all timepoints, except at 6 and 9 months when the average daily sprays of active NMS used since the last visit and in the past 7 days were significantly higher than placebo spray (Table 3). Subjects used relatively little of the spray despite being encouraged to use it whenever they would have had a cigarette and much less than the maximum dose of 30 sprays per day. At 6 months median, daily use was three to four sprays per day. Nicotine patch use was more consistent with the median use to 5 months being almost every day. Anecdotally, many subjects reported that the NMS was peppery and unpleasant, and that this discouraged them from using it more often. This is not evident from the median and mean severity of “hurt mouth” at baseline of 0 and 0.2, respectively, for both active and placebo (0: not at all; 1: slight) groups. However, there was a significant negative correlation between severity score for hurt throat at baseline, and the average number of sprays of NMS use per day reported at the quit phone call (Pearson’s correlation coefficient $= -0.08$, $p = .005$).

**Urges to Smoke and Withdrawal Symptoms**

Compared with baseline, urges to smoke reduced significantly in both the active and placebo groups at all timepoints throughout the trial, with subjects in the active group experiencing significantly greater reductions in total urge scores compared with the control group at 1 and 6 months (Supplementary Table 2). Nicotine withdrawal scores significantly reduced within both active and placebo groups at 3, 6, and 12 months compared with their scores at the 1-month visit, for most of the five subscales of the MNWS (Supplementary Table 3). The only significant difference in withdrawal scores between groups was a larger reduction in insomnia scores at 6 months in the active group compared with control ($p = .02$).

**Allocation Concealment**

The integrity of the blinding was maintained at the 6- and 12-month visits. At both timepoints, the number of subjects in the active group, who thought they were taking active NMS, was not significantly different to the number of subjects, who thought they were on placebo or were unsure. In the placebo group, significantly fewer subjects correctly thought they were taking placebo NMS compared with those who mistakenly thought they were taking active or were unsure ($p = .01$).

**Factors Associated With Prolonged Abstinence**

In a post-hoc analysis, we explored baseline factors for their association with 12-month prolonged abstinence. Table 4 shows the significant univariate associations between a variety of factors and prolonged abstinence at 12 months and then adjusted for the factors in the table. After adjustment, only two remained significant: the number of acquaintances who have quit smoking and current age. Although not significant after adjustment, Miöri ethnicity and attendance at the community trial site were also associated with reduced abstinence at 12 months. In fact 12-month prolonged abstinence for Miöri was almost identical for active or placebo group, 4.9% versus 4.4%, respectively.

We have examined the effects of baseline nicotine dependence on outcomes. For those smoking above the mean number of CPD (≥20) compared with those below, heavier smokers achieved greater prolonged 6-month abstinence (56/405 [13.8%] and 38/406 [9.4%], $p = .047$), whereas 41/405 (10.1%) and 28/406 (6.9%), $p = .10$, participants achieved 12-month prolonged abstinence in the active and control groups, respectively. When we explored nicotine dependence by FTND, those above the mean FTND of 6 compared with those below at baseline did show a significantly greater abstinence at 6 months (64/458 [14.0%] and 39/446 [8.7%), $p = .01$) and a borderline significantly greater prolonged abstinence at 12 months (44/458 [9.6%] and 28/446 [6.3%], $p = .06$) in the active and control group, respectively.

We examined the early use of active and placebo mouth spray (between baseline and the quit telephone call) in relation to 12-month prolonged abstinence. At the quit call, 592/637 (93%) participants had used active mouth spray and 576/619 (93%) participants had used placebo mouth spray since their baseline visit. The OR, adjusted for treatment assignment, for use of mouth spray and achieving 12-month prolonged abstinence was 1.41 (95% CI = 1.20–1.68, $p < .0001$). However, this estimate of the effect of the amount of NMS used on abstinence may be biased because it is a postrandomization effect and is on the causal pathway between treatment and abstinence. We sought to limit the bias from missing data, in estimating the impact of the amount of NMS on prolonged 12-month abstinence, by imputing a range of values for missing data (none, median, and first and third interquartile range [IQR]). In these models with imputed values, which all included treatment assignment as an independent predictor, the OR for use of Zomnic varied from 1.38 (95% CI = 1.17–1.64) for third IQR used to 1.47 (95% CI = 1.26–1.72) for first IQR used, whereas the OR when median use was imputed was 1.46 (95% CI = 1.24–1.74). Miöri used NMS on significantly fewer days than non-Miöri between baseline and the quit phone call (median of “most days” of “every day”, $p = .0002$). Although there were no ethnic differences in side effects at baseline, Miöri reported more severe side effects of NMS than non-Miöri at the quit call (median of “slight” cf. “not at all”) although this just failed to reach significance at $p = .057$. 

296
Table 3. Amount of NMS and Nicotine Patches Used (Median, M, IQR, Number Who Answered, p Value)

<table>
<thead>
<tr>
<th>How often use NMS</th>
<th>Quit phone</th>
<th>1 Month</th>
<th>3 Months</th>
<th>6 Months</th>
<th>9 Months</th>
<th>12 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Active</td>
<td>Placebo</td>
<td>Active</td>
<td>Placebo</td>
<td>Active</td>
<td>Placebo</td>
</tr>
<tr>
<td>0: never; 1: hardly ever; 2: some</td>
<td>4.0, 3.0</td>
<td>4.0, 3.1</td>
<td>3.0, 2.5</td>
<td>3.0, 2.6</td>
<td>1.5, 1.9</td>
<td>1.0, 1.8</td>
</tr>
<tr>
<td>days; 3: most days; 4: every day</td>
<td>2–4</td>
<td>2–4</td>
<td>1–4</td>
<td>1–4</td>
<td>0–4</td>
<td>0–3</td>
</tr>
<tr>
<td></td>
<td>637</td>
<td>619</td>
<td>365</td>
<td>317</td>
<td>222</td>
<td>181</td>
</tr>
<tr>
<td></td>
<td>0.92</td>
<td>0.90</td>
<td></td>
<td></td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>Average daily sprays of NMS</td>
<td>2.0, 3.4</td>
<td>2.0, 3.5</td>
<td>3.0, 2.9</td>
<td>3.0, 3.0</td>
<td>1.0, 1.7</td>
<td>1.0, 1.6</td>
</tr>
<tr>
<td>0: none; 1: 1–2, 2: 3–4, 3: 5–6, 4:</td>
<td>1–6</td>
<td>1–6</td>
<td>1–5</td>
<td>2–5</td>
<td>0–3</td>
<td>0–3</td>
</tr>
<tr>
<td>7–8, 5: 9–15, 6: &gt;15</td>
<td>633</td>
<td>617</td>
<td>379</td>
<td>318</td>
<td>223</td>
<td>182</td>
</tr>
<tr>
<td></td>
<td>0.32</td>
<td>0.48</td>
<td></td>
<td></td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td>How many sprays past 7 days</td>
<td>a</td>
<td>a</td>
<td>1.0, 1.9</td>
<td>1.0, 2.0</td>
<td>0.14</td>
<td>1.13</td>
</tr>
<tr>
<td>0: none; 1: 1–20, 2: 21–30, 3: 31–40,</td>
<td>0–3</td>
<td>0–4</td>
<td>0–3</td>
<td>0–2</td>
<td>0–9.5</td>
<td>0–0</td>
</tr>
<tr>
<td>4: 41–50, 5: 51–60, 6: &gt;60</td>
<td>378</td>
<td>320</td>
<td>222</td>
<td>180</td>
<td>138</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1.25</td>
<td>1.37</td>
<td>0.69</td>
<td>0.53</td>
</tr>
<tr>
<td>How often use patch</td>
<td>4.0, 3.4</td>
<td>4.0, 3.2</td>
<td>4.0, 3.2</td>
<td>4.0, 3.2</td>
<td>4.0, 2.9</td>
<td>4.0, 2.8</td>
</tr>
<tr>
<td>0: never; 1: hardly ever; 2: some</td>
<td>3–4</td>
<td>3–4</td>
<td>3–4</td>
<td>3–4</td>
<td>2–4</td>
<td>1–4</td>
</tr>
<tr>
<td>days; 3: most days; 4: every day</td>
<td>645</td>
<td>629</td>
<td>352</td>
<td>296</td>
<td>219</td>
<td>179</td>
</tr>
<tr>
<td></td>
<td>0.04</td>
<td>0.34</td>
<td>0.53</td>
<td>0.53</td>
<td>0.69</td>
<td>0.69</td>
</tr>
</tbody>
</table>

Note. NMS = nicotine mouth spray.
aNot recorded at these timepoints.
bAt 12 months, the use of patches was recorded by a yes = 1, no = 0 question about whether patches had been used for longer than 5 months.
Table 4. Generalized Linear Model for 12-Month Prolonged Abstinence (Not Smoked on Seven Consecutive Days)

<table>
<thead>
<tr>
<th></th>
<th>Univariate analysis</th>
<th>Multivariate analysis (mutually adjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Intercept</td>
<td>1.47</td>
<td>1.01-2.15</td>
</tr>
<tr>
<td>On active NMS (yes/no)</td>
<td>1.00</td>
<td>0.97-1.02</td>
</tr>
<tr>
<td>Number of previous quit attempts</td>
<td>0.48</td>
<td>0.23-0.89</td>
</tr>
<tr>
<td>Māori ethnicity (yes/no)</td>
<td>0.37</td>
<td>0.18-0.66</td>
</tr>
<tr>
<td>Attended a Kōkiri Marae trial site (yes/no)</td>
<td>1.80</td>
<td>1.23-2.66</td>
</tr>
<tr>
<td>Aged 16 or older when started to smoke daily (yes/no)</td>
<td>0.90</td>
<td>0.81-1.00</td>
</tr>
<tr>
<td>Baseline nicotine dependence severity (FTND score)</td>
<td>0.81</td>
<td>0.67-0.98</td>
</tr>
<tr>
<td>Number of smokers that subjects spend time with on a typical day—0: none, 1: 1–2, 3: 3–5, 4: 6–10, 5: &gt;10</td>
<td>1.28</td>
<td>1.10-1.50</td>
</tr>
<tr>
<td>Number of personal acquaintances who have quit smoking—0: none, 1: 1–2, 3: 3–5, 4: 6–10, 5: &gt;10</td>
<td>0.62</td>
<td>0.41-0.91</td>
</tr>
<tr>
<td>Current age (years)</td>
<td>1.04</td>
<td>1.03-1.06</td>
</tr>
<tr>
<td>Preparedness to handle stressful events without smoking—0: not at all, 1: slightly, 2: moderately, 3: quite a bit, 4: extremely</td>
<td>1.20</td>
<td>0.98-1.47</td>
</tr>
<tr>
<td>Primary Dependence Motives score (WISDM)</td>
<td>0.80</td>
<td>0.68-0.94</td>
</tr>
<tr>
<td>Socioeconomic status (NZDep)</td>
<td>0.92</td>
<td>0.86-0.98</td>
</tr>
</tbody>
</table>

Note. NMS = nicotine mouth spray; FTND = Fagerström Test of Nicotine Dependence; WISDM = Wisconsin Inventory of Smoking Dependence Motives; NZDep = New Zealand Deprivation Index.

**DISCUSSION**

A 1-mg nicotine mouth spray added to a nicotine patch significantly increased abstinence at 1, 3, and 6 months compared with a nicotine patch and placebo mouth spray in an intention-to-treat analysis and for all measures of abstinence. This additional benefit was generally not significantly different from placebo spray after 6 months. Although active NMS was more effective than placebo therapy to 6 months, the absolute number of smokers who achieved long-term abstinence was low. Only 10.1% cf. 7.1% achieved prolonged abstinence (not smoked on seven consecutive days at each follow-up) for 12 months in the active and control groups, respectively. Even fewer subjects achieved unadjusted biologically verified 12-month prolonged abstinence: 8.8% and 6.5% in the active and placebo groups, respectively (p = .10). Thus, although the addition of a nicotine mouth spray to a nicotine patch does significantly improve smoking cessation, compared with a nicotine patch and placebo groups, particularly for the first 6 months, the study did not find evidence for a sustained benefit. Abstinence in the placebo (nicotine patch only) group were similar to studies with low levels of behavioral support (Shiffman et al., 2002) and higher than the nicotine-patch-only arm of a recent New Zealand study of e-cigarettes (Bullen et al., 2013).

A recent placebo-controlled trial of Nicorette™ oral mouth spray alone found that abstinence for active nicotine mouth spray (1 mg/spray) was significantly higher at 12 months than placebo (13.8% vs. 5.6%, p = .007) (Tønnesen et al., 2012). Our results with a similar spray show lower cessation rates at all timepoints and were not sustained beyond 6 months. Previous combination NRT studies using fast-acting nasal preparations of nicotine similarly have shown early advantages that are lost in the long term (Croghan et al., 2003). One study with nasal nicotine that was available for a year showed significant improvements over patch alone to 12 months (27% vs. 11%, p = .001). Further follow-up at 6 years continued to show nonsignificant differences (16% vs. 9%, p = .08) for the combination versus patch alone (Blondal et al., 1999).

There are a number of reasons, in addition to lack of efficacy, why the combination of an oral nicotine spray and patch may have failed to significantly improve abstinence after 6 months in our study. First, smoking has been the subject of considerable and widespread community and legislative action with bans on all indoor smoking in public places and an escalating tobacco tax. Many smokers able to quit have already done so, and those that continue to smoke, arguably, are likely to be those who have found it most difficult to quit in the face of these public health measures. This is supported in our study population by the large number of quit attempts (a = 5) and high previous use of NRT (81%), and considerably higher, for example, than the participants in the Nicorette™ trial. Second, as Bolliger, Van Blij and Axelsson (2007) suggested in a pilot study of NMS, the 1-mg dose is unpleasant. This was also our experience with complaints of the unpleasant burning peppery taste, a reduced dose/spray may improve this. However, the 1-mg/spray preparation is the formulation most commonly used. Third, NRT was discontinued at 6 months and more prolonged availability and use of both products might have helped those who relapsed after initial success. Fourth, we recognize that the combination of patch and mouth spray might have been more effective after 6 months had we included more frequent behavioral counseling. However, in the New Zealand, smoking cessation environment intense counseling is unlikely to be a major component of cessation strategies.

We observed that both age and the number of participants’ acquaintances that had successfully stopped smoking
were independent predictors of long-term success (Table 4). Age is a well-known predictor of success as has been shown in previous studies (Aveyard & West, 2007). The positive influence of friends who have quit smoking is supported by evidence from the NZ Quitline, where smokers who use online blogs while trying to quit were more successful than those who did not, suggesting that these peer self-support mechanisms are important for a successful outcome. Early use of the combination was also a strong predictor of a successful outcome at 12 months.

Māori had significantly lower abstinence rates, although the effect size for active treatment was the same for Māori and non-Māori. Māori were less successful than non-Māori in quitting long term, although as seen in Table 4 adjustment for baseline factors decreased this difference. Māori used the active spray less often and reported more severe side effects from the spray than non-Māori, which may have contributed to their reduced success. The low use of NMS among Māori and their lower abstinence rates in the present trial is consistent with the lower use of conventional NRT by Māori in the community (Thornley, Jackson, McRobbie, Sinclair, & Smith, 2010) and their 50% lower abstinence rates in the community, which has been attributed at least in part to community inequality (Barnett, Pearce, & Moon, 2009). Lower use of NRT has also been reported in ethnic minorities in other countries (Fu et al., 2003).

Among current New Zealand smokers, the combination of a nicotine patch and oral nicotine spray offers short-term benefits for smokers wanting to quit, but they are not sustained. This and the overall low rate of success in this trial suggests that alternative less aversive combination NRT treatments need to be examined and that such treatments should be used for longer periods.

SUPPLEMENTARY MATERIAL

Supplementary Tables 1–3 can be found online at http://www.ntr.oxfordjournals.org

FUNDING

This research was funded by the Health Research Council of New Zealand (HRC 09/200). Active Zonic mouth-spray was provided by Niconovum. Placebo Zonic was manufactured by Argenta according to instructions from Niconovum. Nicotine patches were provided without charge by the New Zealand Ministry of Health.

DECLARATION OF INTERESTS

None declared.

ACKNOWLEDGMENTS

We would like to thank all the participants who participated. We acknowledge the statisticians who helped with the analysis: Nevil Pierse, Tak Ikeda, and Gordon Purdie; and the staff who helped conduct the trial: Claire Honeywill, Stephen Ballinger, Jeela Kumar, Jack Pitcher, Nichole Craig, Amer Siddig Amer Nordin, Anton Harper, Marie Ditchburn, and Jo Bailey.

REFERENCES


Dear Madam

Re: Amendments to Zonnic Trial CEN/09/08/055

I am writing to you in reference to the request by Professor Julian Crane, emailed on the 5th November 2010. As mentioned by Prof. Crane, I am a psychiatrist currently doing work with the ZAP Study at the National Addiction Centre site in Christchurch. I am keen to do my PhD research with the study sample in Christchurch looking at the role of depression and weight towards a successful quitting in a smoking cessation trial.

Essentially, my study will involve additional questionnaires looking at the items of interest, which are depression and weight including food craving. I will also invite a number of participants to focus groups or individual interviews to better understand their experiences taking part in a smoking cessation programme.

As requested, I am enclosing together with this letter a brief outline of my study, the questionnaires that will be used, the patient information sheet and the informed consent forms (both amendment to the current one used in Christchurch and also for focus groups).

My study will be supervised by Prof. Doug Sellman and Dr Simon Adamson in the National Addiction Centre. For the focus groups section, I will be in consultation with Dr Ria Schroder, a Research Fellow in the National Addiction Centre.

I hope that the committee will consider my application for an amendment.

Finally, thank you again for your time and consideration.

Kind regards

Dr Amer Siddiq Amer Nordin
PhD Student
National Addiction Centre
Dear Amer Nordin

As per our telephone discussion today, CEN/09/08/055 has been approved under delegated authority. A formal letter will follow shortly. However, in the meantime, you may commence your study.

best regards
Sonia Scott
Appendix C - Consent

Participant Information Sheet

Only ten percent of people who use nicotine replacement therapy (NRT) to quit smoking will be successful at 12 months. Therefore new, more effective, nicotine replacement therapies are needed.

This study aims to test Zonnic (a nicotine mouth-spray) taken together with nicotine patches.

Nicotine patches give you a small continuous dose of nicotine via your skin which helps reduce withdrawal symptoms from stopping smoking (such as irritability, restlessness, poor concentration etc).

Nicotine patches do not completely stop you from craving cigarettes.

Zonnic is likely to help more people to quit because when they get cravings to smoke they can use Zonnic instead of smoking a cigarette to get rid of the craving.

Zonnic is a nicotine mouth-spray that is squirited in your mouth between your cheek and gum. It has a peppermint flavour and causes an immediate mild peppery tingle in your mouth (caused by nicotine). It helps reduce your craving to smoke within minutes but not as fast as smoking a cigarette does, so you will still have to rely a lot on your determination and strength of will not to smoke.

In this study, you will use nicotine patches each day for 5 months and Zonnic for 6 months.

You will take one patch per day and can use Zonnic as often as you like (within the recommended dose range).

To make the study scientific, half of participants will get active Zonnic and half will get inactive (placebo) Zonnic. All participants will receive active nicotine patches.

Whether you receive the active or inactive Zonnic will be determined by chance (computer randomisation).

We will inform you of whether you were taking the active or placebo-Zonnic at the end of the study.

You can keep smoking for the first three weeks that you take the Zonnic and patches, but we ask that you reduce the amount you smoke, so that you quit smoking at the end of the third week. We ask you to remain quit from smoking from then on. But if you do smoke after the third week, please continue to take part in this study – try to increase the amount of Zonnic that you use and try to smoke as little as possible, and try to quit again as soon as you can.
You can choose whether to take part in this study in Wellington or Christchurch. In Wellington you can choose between the University of Otago, Wellington, next to the hospital in Newtown or Tu Kotahi at the Kokiri Marae in Seaview. In Christchurch you can take part via the University of Otago, Christchurch, at the National Addiction Centre on Oxford Terrace near Hagley Park.

**Who can take part in this study?**

Anyone who is aged between 18 and 70 and who smokes 9 or more cigarettes per day.

**Who cannot take part in this study?**

People who are allergic to nicotine patches. Those with a serious medical condition and/or high blood pressure, and/or something wrong with their heart or blood vessels (fast or irregular heart rhythm, angina, chest pain, had a heart attack or stroke within the last 3 months), and/or who have ever had a stomach ulcer, heartburn, a stroke, kidney disease, liver disease, over-active thyroid, phaeochromocytoma (tumour of the adrenal gland). Pregnant women and women who are not using appropriate contraception (for heterosexual contact, appropriate contraception includes use of condoms by men or oral contraceptive by women). People who regularly exceed the recommended guideline amount of alcohol, and/or use illegal drugs. Those taking medicines such as: theophylline, imipramine, pentazocine.

**How to use the mouth-spray**

Spray onto the inside of your cheek between the cheek and the gum, using one to two sprays at a time. If you use two sprays, spray one onto the left-hand cheek and one onto the right-hand cheek to ensure as much of the nicotine gets absorbed across your cheek and that you swallow as little as possible. In order for the nicotine to be absorbed into your blood, it needs to be absorbed across your cheek. If you swallow the nicotine only a small amount will get into your blood because your liver will remove most of it. One spray delivers 1 mg of nicotine. The maximum dose recommended by the manufacturer is 30 sprays per day. If you use too much mouth-spray you will feel nauseous and dizzy, so if you feel these symptoms, reduce the amount of sprays you take.

**What side effects does Zonnic have?**

Side effects that occur with 1% or more of people: dizziness, headache, gastrointestinal discomfort (heartburn, nausea), hiccups, vomiting, irritated mouth or throat.
Side effects that occur in 1% to 0.1% of people: fast heart rate, red blotches on skin, hives.

Side effects that occur less than 0.01% of the time: irregular heart beat, allergic reactions (e.g. swelling and redness of skin).

If you have these symptoms, reduce the number of sprays of Zonnic that you take. If these symptoms persist and/or become bothersome, inform us and/or your doctor. Notify us and/or your doctor if you develop: breathing difficulties, chest pain, irregular heartbeat, nervousness, anxiety, tremors. If you notice other effects not listed above, contact us and/or your doctor.

**What side effect do patches have?**

Side effects that occur within 2% or more of people: abdominal pain, heart burn, acid reflux, indigestion, stomach upset, nausea skin allergy, coughing, abnormal dreaming, joint pain, headaches, dizziness, light headedness.

Side effects that occur within 1 to 2% of people: insomnia, sleepiness, impaired concentration, vomiting, chest pain, fatigue, pain, blood pressure changes.

Side effects that occur in less than 1% of people: hot flushes, swelling of the skin near the patch, weight gain, extra heart beats, high blood pressure, rapid irregular heart beat, stomach ulcer, dry mouth, flatulence, inflamed gums, pain upon swallowing, abnormal stool, change in your sense of taste, abnormal vision, shortness of breath, increased appetite, leg cramps, migraine, itchiness, increased sweating, red blotches on skin, acne.

Most side effects will go away in the first few days as your body adjusts to the medication. If these symptoms persist or become bothersome, inform us and/or your doctor. If the area around the patch becomes red, itchy or irritated, remove it and try a new site. If the irritation continues or becomes worse, notify us and/or your doctor. When you notify us we can talk with you about the possibility of using a lower dose patch, or using it for fewer hours of the day. Notify us and/or your doctor if you develop: breathing difficulties, chest pain, irregular heartbeat, nervousness, anxiety, tremors. If you notice other effects not listed above, contact us and/or your doctor.

**Do I get paid to take part?**

No, you do not get paid. We are not able to cover any costs that you may incur by taking part in this study (e.g. parking costs).
What is involved in taking part in this study?

- **Less than one hour per week!!**
- 5 visits to the University of Otago (Wellington or Christchurch) or Kokiri Marae (20 – 60 minutes per visit). Week 1 visit will be the longest and may take up to 60 minutes. Further visits will be at weeks 8, 16, 29 and 55.
- The visits involve answering questionnaires (smoking and related issues such as mood and weight), blowing into a machine that can detect whether you have smoked, checking your blood pressure and receiving counselling from the researchers.
- At the last visit (Week 55) we will ask for a small hair sample from your head to see if you smoked in the previous month.
- Record on diary cards how much you smoke and how much Zonnic you use each day during the study.
- Week 1 - 3: start using patches and Zonnic and reduce your smoking each week so you quit by the end of week 3.
- Week 4 - 18: continue using patches daily and Zonnic as often as you like, but do not smoke from this point onwards. If you do smoke, please record it. If you start smoking regularly, please let us know and we can offer you further assistance. We will phone you around the time that you quit smoking to offer you brief counselling and advice.
- Week 19 - 22: use lower doses of patches so you stop patches by end of Week 22; continue using as much Zonnic as you like during this period.
- Week 23 - 26: use less Zonnic each week so that you have stopped Zonnic by end of Week 26. Keep some Zonnic with you so you can use Zonnic instead of smoking if you have a strong urge to smoke.
- Week 26 - 55: stay smoke free, phone or email researchers if you have concerns. You will keep a bottle of Zonnic to use, just in case you still get a strong urge to smoke (but only use Zonnic if you really have to during this time). If you smoke regularly, please let us know because you may need more assistance. In Week 42 we will phone you to catch up with how you are doing and provide brief counselling and advice.
- You may also be invited to attend a focus group session at a later date to talk about your experience in the programme.

The up-side of taking part in this study:

- The study is **FREE**;
- Five visits with researchers to help you to quit smoking;
- Active nicotine patches to everyone to help you quit smoking;
- Active Zonnic for half the participants to help quit smoking; and
- You will gain a better understanding of why you smoke and how to quit.

The down-side of taking part in this study:

- The hassle of 5 visits to the medical school (we can do visits on weekends and after work-hours);
- The time involved in recording your smoking and use of Zonnic on diary cards;
- The Zonnic and patches will not be a perfect solution, it will still be hard to quit (but not as hard as going cold-turkey); and
The study has a very long duration of 13 months (55 weeks), and we would ask that you remain available for clinic visits on the scheduled dates.

You can stop taking part in the study whenever you want.

**Future Availability of Zonnic**

Zonnic is not currently licensed as a medicine in New Zealand. It may take a year or more to license it for sale as a medicine in New Zealand.

**Compensation**

In the unlikely event of a physical injury as a result of your participation in this study, you may be covered by ACC under the Injury Prevention, Rehabilitation and Compensation Act. ACC cover is not automatic and your case will need to be assessed by ACC according to provisions of the 2002 Injury Prevention and Compensation act. If your claim is accepted by ACC, you still might not get any compensation. This depends on a number of factors such as whether you are an earner or non-earner. ACC usually provides only partial reimbursement for costs and expenses and there may be no cover for mental injury unless it is a result of physical injury. If you have ACC cover, generally this will affect your right to sue the investigators. For more details, refer to [http://www.acc.co.nz](http://www.acc.co.nz).

**Confidentiality and Privacy**

All information collected will be held confidentially by our research staff.

All records will be securely stored in the research facility.

We aim to have the results of the study published in the international medical literature and we will send you a copy of the paper once it becomes available. No identifying data will be included in any publications. When the study is complete we will remove your name from all the data and leave only the identification number remaining. We will keep this anonymous data securely in locked files for future analysis. We would have to gain additional ethical approval if we were to use these anonymous data in the future.

**Ethical Approval**

This study has been reviewed and approved by the Central Region Ethics Committee. If you have any concerns about the study, please contact them by telephoning (04) 496-2405.
Health Advocate

If you have any queries or concerns regarding your rights as a participant in this study you may wish to contact a Health and Disability Advocate, telephone Mid and lower North Island 0800 4 23638 (4 ADNET) or Christchurch (03) 377-7501.

Contact Researchers

If you have any questions about this study, please contact the Research Team. The primary contacts are:

Free phone – 0800 318 167 or

Wellington - Brent Caldwell (04) 918-6041 or 021 872-264;
Lower Hutt - Cheryl Davies (04) 939-4629;
Christchurch - Marie Ditchburn (03) 364-0480;
Email - zonnic@otago.ac.nz; and
www.otago.ac.nz/zonnic
The purpose of this study has been explained to me. I understand the nature of the test procedures to be carried out. All of these aspects have been explained to my satisfaction, and I have had the opportunity to discuss them with the investigators and have had time to consider whether to take part.

I understand that my participation in this study is entirely voluntary, and that at any stage I can withdraw from the study and this will not interfere with my future treatment.

I understand that I will be required to attend the Wellington School of Medicine or the National Addiction Centre (Christchurch) on 5 occasions by arrangement, but that at any time during the study I may withdraw from further participation.

I understand that I will NOT be paid for participating in this study, and that my expenses (such as parking) will NOT be reimbursed.

I understand that I will be asked to provide a small hair sample (5-10 strands of hair) at the end of the study, to test for nicotine. This test procedure dissolves the hair, so that it becomes liquid. The liquid is disposed of as soon as the test is completed.

I understand that information obtained during this study is confidential and will not be used in any way that could identify me, or for any other purpose than fulfilling the aims of the study.

I understand that my participation will be stopped if it should appear to be harmful to me.

I give permission for my general practitioner to be informed that I will be taking part in this study: ..........................................................YES / NO

I give permission for an anonymous version of my data (data with my name removed) to be retained in a secure location at the medical school, for use in future studies, as long as they have gained ethical approval: ..........................................................YES / NO

I wish to receive a copy of the results: ..........................................................YES / NO

I wish to participate in a focus group discussion at a later date: .........................YES / NO

I .......................................................... hereby consent to take part in this study.

(full name, block capitals)

Signed:..................................................................................Date:..........................................................
THE ROLE OF DEPRESSION AND WEIGHT ON SUCCESSFUL QUITTING IN A SMOKING CESSATION TRIAL

You may recall completing questionnaires regarding mood changes and food craving. You may also recall that some of the participants in the ZAP Study will be invited to take part in a focus group discussion regarding these issues and also their experiences within a smoking cessation program like the ZAP study.

I am writing to invite you for such a focus group discussion. The focus group discussion will involve a small group of 6-8 participants and will be held in the seminar room on the 3rd Floor of Terrace House, where you are currently coming for visits. It will last between an hour or two. These sessions will be moderated by myself and Dr Ria Shroder, a Research Fellow at the National Addiction Centre (NAC). Sessions will be recorded with a digital audio player to ensure good data collection and completeness.

Your input into this research will be invaluable in assisting us to understand further the issues involved with quitting smoking in order to improve smoking cessation programs in the future. You will receive a fuel voucher of NZD20 to partly compensate your time.

Your participation in this study is strictly confidential. Participants involved will be provided a pseudonym e.g. Ms A, Mr A, Ms B etc. to identify individual input during the course of the interview and on transcribing the digital audio taped discussions. No information that could personally identify you will be used in any forms, reports or publications based on this study and no information will be passed onto any other individual or group.

We look forward to your participation in this interesting and worthwhile study.

Yours sincerely,

Dr Amer Siddiq Amer Nordin
Principal Investigator

Prof Dr Doug Sellman
Primary Supervisor
Consent Form (Focus Group)

THE ROLE OF DEPRESSION AND WEIGHT ON SUCCESSFUL QUITTING IN A SMOKING CESSATION TRIAL

1. I have read and understood the information outlining a study designed to gather information regarding mood, food craving and the experience in partaking in a smoking cessation programme.

2. I understand that taking part in this study is voluntary (my choice) and I have not been influenced in any way to participate.

3. I have had adequate time to consider whether to take part in this study.

4. I understand that my participation in this study is strictly confidential and no material which could identify me will be used in any reports or publication based on this study.

5. I understand that I may withdraw from this study at any time.

I...............................................................................................................................................(full name) hereby consent to take part in this study.

Date...................................................................................................................................................

Signature.............................................................................................................................................

Principal investigator: Dr Amer Siddiq Amer Nordin, MBChB (Otago), M. Psych Med (Malaya)

Researcher/Doctor of Philosophy Student
Appendix D - Questionnaires

Mood Questionnaire 1

Doctors are aware that emotions play an important part in most illnesses and if your doctor knows about these feelings he/she will be able to help you more. This questionnaire is designed to help your doctor know how you feel.

Read each item and place a firm tick to the statement that comes closest to how you have been feeling in the PAST WEEK.

Don’t take to long to think the answer, your immediate reaction to each item will possibly be more accurate than a long thought out response.
A. **I feel tense or ‘wound up’**:  
3  Most of the time  
2  A lot of the time  
1  Time to time, occasionally  
0  Not at all  

D. **I still enjoy the things that I used to enjoy**:  
0  Definitely as much  
1  Not quite so much  
2  Only a little  
3  Hardly at all  

A. **I get a sort of frightened feeling as if something awful is about to happen**:  
3  Very definitely and quite badly  
2  Yes, but no too badly  
1  A little, but it doesn’t worry me  
0  Not at all  

D. **I have lost interest in my appearance**:  
3  Definitely  
2  I don’t take as much care as I should  
1  I may not take as much care  
0  I take just as much care as ever  

A. **Worrying thoughts go through my mind**:  
3  A great deal of the time  
2  A lot of the time  
1  From time to time but not often  
0  Only occasionally  

D. **I feel cheerful**:  
3  Not at all  
2  Not often  
1  Sometimes  
0  Most of the time  

A. **I get a sort of frightened feeling like “butterflies” in my stomach**:  
0  Not at all  
1  Occasionally  
2  Quite often  
3  Very often  

D. **I can laugh and see the funny side of things**:  
0  As much as I always could  
1  Not quite so much now  
2  Definitely not so much now  
3  Not at all  

A. **I feel restless as if I have to be on the move**:  
3  Very much indeed  
2  Quite a lot  
1  Not very much  
0  Not at all  

D. **I look forward to enjoyment to things**:  
0  As much as I ever did  
1  Rather less than I used to  
2  Definitely less than I used to  
3  Hardly at all  

A. **I can sit at ease and feel relaxed**:  
0  Definitely  
1  Usually  
2  Not often  
3  Not at all  

D. **I can enjoy a good book or radio or tv programme**:  
0  Often  
1  Sometimes  
2  Not often  
3  Very Seldom
Mood Questionnaire 2

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way that you have been feeling during the PAST TWO WEEKS including today. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group including item 16 (changes in sleeping pattern) or item 18 (changes in appetite).
1. Sadness
0  I do not feel sad
1  I feel sad much of the time
2  I am sad all the time
3  I am so sad or unhappy that I can’t stand it

2. Pessimism
0  I am not discouraged about my future
1  I feel more discouraged about my future than I used to be
2  I do not expect things to work out for me
3  I feel my future is hopeless and will only get worse

3. Past failure
0  I do not feel like a failure
1  I have failed more than I should have
2  As I look back I see a lot of failures
3  I feel I am a total failure as a person

4. Loss of Pleasure
0  I get as much pleasure as I ever did from the things I enjoy
1  I don’t enjoy things as much as I used to
2  I get very little pleasure from the things I used to enjoy
3  I can’t get any pleasure from the things I used to enjoy

5. Guilty Feelings
0  I don’t feel particularly guilty
1  I feel guilty over many things that I have done or should have done
2  I feel quite guilty most of the time
3  I feel guilty all the time

6. Punishment Feelings
0  I don’t feel that I am being punished
1  I feel I may be punished
2  I expect to be punished
3  I feel I am being punished

7. Self Dislike
0  I feel the same about myself as ever
1  I have lost confidence in myself
2  I am disappointed in myself
3  I dislike myself

8. Self Criticalness
0  I don’t criticize or blame myself more than usual
1  I am more critical of myself than I used to be
2  I criticize myself for all of my faults
3  I blame myself for everything bad that happens

9. Suicidal Thoughts or Wishes
0  I don’t have any thoughts of killing myself
1  I have thought of killing myself but I would not carry them out
2  I would like to kill myself
3  I would kill myself if I had the chance

10. Crying
0  I don’t cry anymore than I used to
1  I cry more than I used to
2  I cry over every little thing
3  I feel like crying but I can’t

11. Agitation
0  I am no more restless or wound up than usual
1  I feel more restless or wound up than usual
2  I am so restless or agitated that it’s hard to stay still
3  I am so restless or agitated that I have to keep moving or doing something

12. Loss of Interest
0  I have not loss interest in other people or activities
1  I am less interested in people or things than before
2  I have lost most of my interest in other people or things
3  It’s hard to get interested in anything

13. Indecisiveness
0  I make decisions about as well as ever
1  I find it more difficult to make decisions than usual
2  I have much greater difficulty in making decisions than I used to
3  I have trouble making any decisions
14. Worthlessness
0 I do not feel I am worthless
1 I don't consider myself as worthwhile and useful as I used to
2 I feel more worthless as compared to other people
3 I feel utterly worthless

15. Loss of Energy
0 I have as much energy as ever
1 I have less energy than I used to have
2 I don’t have enough energy to do very much
3 I don’t have enough energy to do anything

16. Changes in Sleeping Pattern
0 I have not experienced any change in my sleeping pattern
1a I sleep somewhat more than usual
1b I sleep somewhat less than usual
2a I sleep a lot more than usual
2b I sleep a lot less than usual
3a I sleep most of the day
3b I wake up 1-2 hours early and can’t get back to sleep

17. Irritability
0 I am no more irritable than usual
1 I am more irritable than usual
2 I am much more irritable than usual
3 I am irritable all the time

18. Changes in Appetite
0 I have not experienced any change in my appetite
1a My appetite is somewhat less than usual
1b My appetite is somewhat more than usual
2a My appetite is much less than before
2b My appetite is much greater than before
3a I have no appetite at all
3b I crave food all the time

19. Concentration Difficulty
0 I can concentrate as well as ever
1 I can’t concentrate as well as usual
2 It’s hard to keep my mind on anything for very long
3 I find I can’t concentrate on anything

20. Tiredness or Fatigue
0 I am no more tired or fatigued than usual
1 I get more tired or fatigued more easily than usual
2 I am too tired or fatigued to do a lot of things I used to do
3 I am too tired or fatigued to do most of the things I used to do

21. Loss of Interest in Sex
0 I have not noticed any recent change in my interest in sex
1 I am less interested in sex than I used to be
2 I am much less interested in sex now
3 I have lost interest in sex completely
Food Questionnaire 1

Non-Essential Energy Dense Nutritionally Deficient (NEEDNT) Foods

This questionnaire consist of 44 examples of food or food groups. We will be monitoring your consumption over the course of the study.

Please write down **HOW MANY TIMES** you have eaten these foods in **THE LAST 7 DAYS**

<table>
<thead>
<tr>
<th>Food Examples</th>
<th>Number of times</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Alcoholic drinks</td>
<td></td>
</tr>
<tr>
<td>2. Biscuits</td>
<td></td>
</tr>
<tr>
<td>3. Butter (used as a spread or in baking/cooking etc.)</td>
<td></td>
</tr>
<tr>
<td>4. Cakes</td>
<td></td>
</tr>
<tr>
<td>5. Chocolate</td>
<td></td>
</tr>
<tr>
<td>6. Coconut Cream</td>
<td></td>
</tr>
<tr>
<td>7. Corn chips</td>
<td></td>
</tr>
<tr>
<td>8. Cream</td>
<td></td>
</tr>
<tr>
<td>9. Packet chips/crisp (both potato and vegetable)</td>
<td></td>
</tr>
<tr>
<td>10. Desserts / puddings</td>
<td></td>
</tr>
<tr>
<td>11. Doughnuts</td>
<td></td>
</tr>
<tr>
<td>12. Energy drinks</td>
<td></td>
</tr>
<tr>
<td>13. Flavoured milk</td>
<td></td>
</tr>
<tr>
<td>14. Food tinned in syrup (even lite syrup!)</td>
<td></td>
</tr>
<tr>
<td>15. Fried food</td>
<td></td>
</tr>
<tr>
<td>16. Frozen yoghurt</td>
<td></td>
</tr>
<tr>
<td>17. Fruit juice (except tomato juice and unsweetened blackcurrant juice)</td>
<td></td>
</tr>
<tr>
<td>18. High fat (≥ 10g fat per 100g) crackers</td>
<td></td>
</tr>
<tr>
<td>19. Honey</td>
<td></td>
</tr>
<tr>
<td>20. Hot chips</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>21</td>
<td>Ice cream</td>
</tr>
<tr>
<td>22</td>
<td>Jam</td>
</tr>
<tr>
<td>23</td>
<td>Marmalade</td>
</tr>
<tr>
<td>24</td>
<td>Mayonnaise</td>
</tr>
<tr>
<td>25</td>
<td>Muesli bars</td>
</tr>
<tr>
<td>26</td>
<td>Muffins</td>
</tr>
<tr>
<td>27</td>
<td>Nuts roasted in fat or oil</td>
</tr>
<tr>
<td>28</td>
<td>Pastries</td>
</tr>
<tr>
<td>29</td>
<td>Pies</td>
</tr>
<tr>
<td>30</td>
<td>Popcorn with butter</td>
</tr>
<tr>
<td>31</td>
<td>Quiches</td>
</tr>
<tr>
<td>32</td>
<td>Reduced cream</td>
</tr>
<tr>
<td>33</td>
<td>Regular Luncheon sausage</td>
</tr>
<tr>
<td>34</td>
<td>Regular powdered drinks (e.g. raro, reflex, hot chocolate, milo)</td>
</tr>
<tr>
<td>35</td>
<td>Regular Salami</td>
</tr>
<tr>
<td>36</td>
<td>Regular Sausages</td>
</tr>
<tr>
<td>37</td>
<td>Regular soft drinks</td>
</tr>
<tr>
<td>38</td>
<td>Sour Cream</td>
</tr>
<tr>
<td>39</td>
<td>Sugar (added to anything including drinks, baking, cooking etc)</td>
</tr>
<tr>
<td>40</td>
<td>Sweets/Lollies</td>
</tr>
<tr>
<td>41</td>
<td>Syrups such as Golden Syrup, Treacle, maple syrup</td>
</tr>
<tr>
<td>42</td>
<td>Takeaways (e.g. fish &amp; chips, McD, KFC, Chinese, Thai, Indian)</td>
</tr>
<tr>
<td>43</td>
<td>Toasted muesli</td>
</tr>
<tr>
<td>44</td>
<td>Yoghurt type products with ≥ 10g sugar per 100g yoghurt</td>
</tr>
</tbody>
</table>
Food Questionnaire 2

QCSRF

For questions 1-2, fill in the circle which best describes your craving for sweet or rich food. Use this 7-point scale:

1 Rate your strongest desire for sweet or rich food during this PAST WEEK:
   None at All  A Little  A Moderate Amount  Very Much  More Than Ever
   O           O         O           O          O

2 Rate how intense your desire for sweet or rich food was, overall, during the PAST WEEK:
   O           O         O           O          O

For question 3, fill in the circle which best describes your feelings about sweet or rich food during the PAST WEEK. Use this 7-point scale:

3. To what extent have you thought about sweet or rich food?
   None at All  A Little  A Moderate Amount  Very Much  More Than Ever
   O           O         O           O          O

INSTRUCTIONS: Fill in a circle to indicate how strongly you agree or disagree with the following:

1. Having something sweet and rich to eat would make me feel less depressed.  Strongly disagree  O           O         O           O          O  Strongly agree

2. I crave something sweet and rich to eat right now.  Strongly disagree  O           O         O           O          O  Strongly agree

3. Having something sweet and rich to eat would make me happier now.  Strongly disagree  O           O         O           O          O  Strongly agree

4. I have an urge for something sweet and rich to eat.  Strongly disagree  O           O         O           O          O  Strongly agree

5. I would be less irritable now if I could have something sweet and rich to eat.  Strongly disagree  O           O         O           O          O  Strongly agree

6. I would not be able to control how much rich and sweet food I ate if I had something here to eat.  Strongly disagree  O           O         O           O          O  Strongly agree
Food Questionnaire 3

Yale Food Addiction Scale (Short Version)  
Gearhardt, Corbin, Brownell, 2009  
Contact: ashley.gearhardt@yale.edu

This survey asks about your eating habits in the PAST 1 MONTH. People sometimes have difficulty controlling their intake of certain foods such as:
- Sweets like ice cream, chocolate, doughnuts, cookies, cake, candy, ice cream
- Starches like white bread, rolls, pasta, and rice
- Salty snacks like chips, pretzels, and crackers
- Fatty foods like steak, bacon, hamburgers, cheeseburgers, pizza, and French fries
- Sugary drinks like soda pop

When the following questions ask about “CERTAIN FOODS” please think of ANY food similar to those listed in the food group or ANY OTHER foods you have had a problem with in the past 1 month

<table>
<thead>
<tr>
<th>IN THE PAST 1 MONTH:</th>
<th>Never</th>
<th>Once a month</th>
<th>2-4 times a month</th>
<th>2-3 times a week</th>
<th>4 or more times or daily</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I find myself continuing to consume certain foods even though I am no longer hungry</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. I worry about cutting down on certain types of food</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I feel sluggish or fatigued from overeating</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>4. I have spent time dealing with negative feelings from overeating certain foods instead of spending time in important activities such as time with family, friends, work or recreation</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>5. I have had physical withdrawal symptoms such as agitation and anxiety when I cut down on certain foods. (Do NOT include withdrawal symptoms caused by cutting down on caffeinated beverages such as soda pop, coffee, tea, energy drinks, etc.)</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>6. My behavior with respect to food and eating causes me significant distress.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>7. Issues related to food and eating decrease my ability to function effectively (daily routine, job/school, social activities, family activities, health difficulties).</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IN THE PAST 1 MONTH:</th>
<th>NO</th>
<th>YES</th>
</tr>
</thead>
<tbody>
<tr>
<td>8. I kept consuming the same types of food or the same amount of food even though I was having emotional and/or physical problems.</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>9. Eating the same amount of food does not reduce my negative emotions or increase pleasurable feelings the way it used to.</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Question Guide – Focus Group: Depression, Weight and Smoking Cessation

Programme
Themes:
1. Focus or structured programme versus adhoc or on your own
2. One on one versus group or on your own
3. Hard core smokers need more intense program
4. Programme expectations
5. Comparing to previous attempts
6. Any role for present model for smokefree NZ 2025

Depression
1. Mood changes or symptom relapse/ worsening
2. Different programme more effective for smokers with depression
3. Using smoking as a treatment
4. Smoking enables inclusion to a group
5. Cigarettes as a friend
6. Understanding on depression on smoking cessation

Weight
1. Is weight still important in quitting smoking
2. Is there an acceptable limit of weight gain
3. Weight affecting contemplation/action/ relapse in smoking cessation
4. Understanding of weight gain on smoking cessation

Resilience
1. Earthquake affecting quit attempt
2. Reasons to continue stopping/strategies that helped cope/ any role of programme
3. First response of earthquake day
4. Why were some managing to stay quit and others relapse
5. Why did some lapse but re-quit whilst others continue to smoke